ENGINEERING AND MINING JOURNAL

Give enough!

A McGRAW HILL PUBLICATION

OCTOBER 1951

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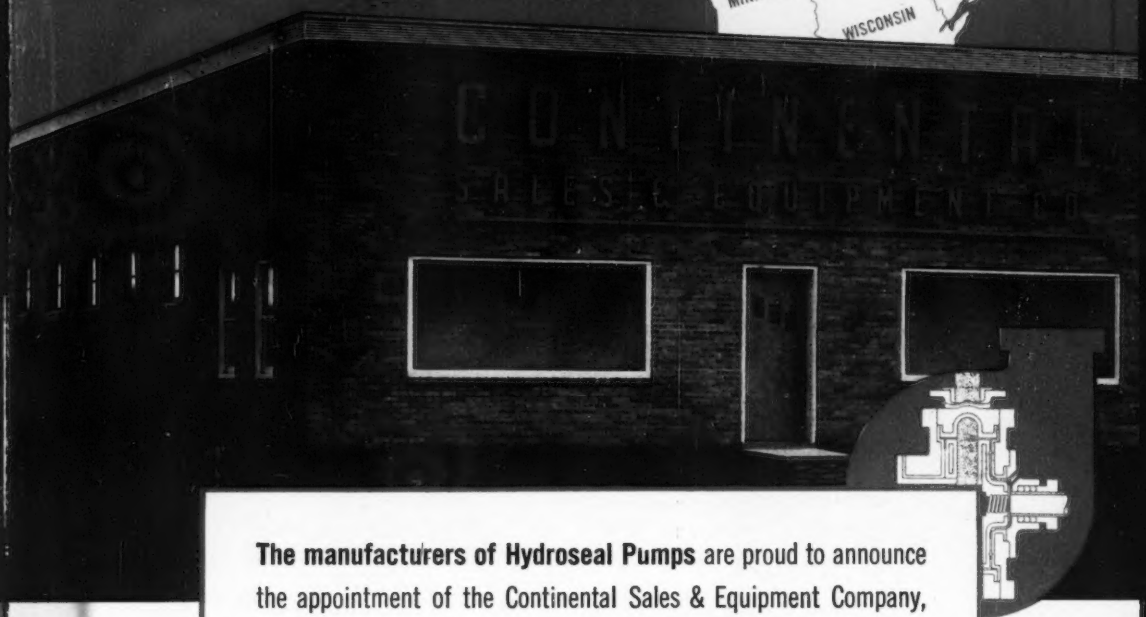
FOUNDED 1866

Anaconda's "Con" Kelley His dream for Butte's future should reach fruition in 1952

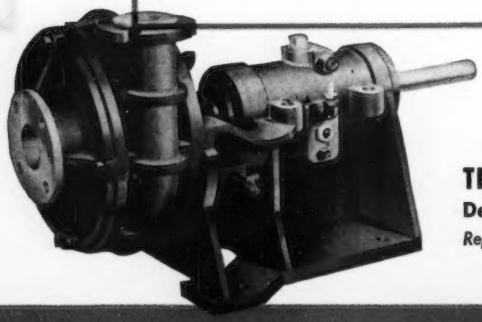
BETTER PUMPING SERVICE

for a key mining area



Modern warehouse of the Continental Sales & Equipment Company, Hibbing, Minnesota.

The manufacturers of Hydroseal Pumps are proud to announce the appointment of the Continental Sales & Equipment Company, Hibbing, Minnesota, as their agent for Minnesota, northern Wisconsin, and the upper peninsula of Michigan. If you're in this area and have a pumping problem, you can be sure of getting good pumps and good advice from General Manager Donald W. Scott and his staff. For your added convenience, a complete line of spares will be maintained at all times.



THE ALLEN-SHERMAN-HOFF PUMP CO.
Dept. B, 259 E. Lancaster Ave., Wynnewood, Pa.
Representatives in Most Principal Cities

HYDROSEAL SAND, SLURRY & DREDGE PUMPS
MAXIMIX RUBBER PROTECTED

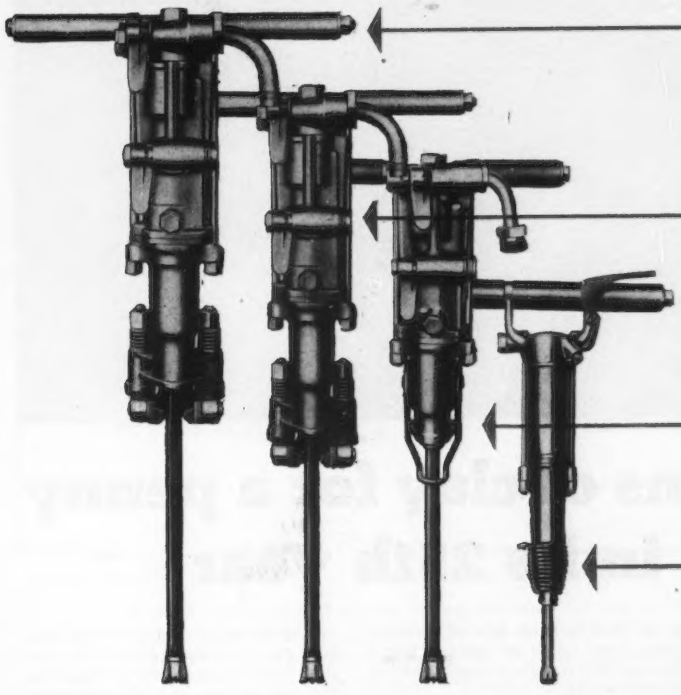
HYDROSEAL, PACKLESS AND MAXIMIX DESIGNS ARE COVERED BY PATENTS AND APPLICATIONS IN THE MAJOR MINING CENTERS OF THE WORLD

For Maximum Production

Match the JACKHAMER to the JOB!

This complete I-R line offers you a rugged, powerful Jackhamer for each type of service

Today's need for higher and higher production, with limited manpower, makes the *efficiency* of your rock drilling equipment more important than ever before. You get more footage per man hour—with minimum effort and fatigue—when you use an Ingersoll-Rand Jackhamer of the correct weight and power for the work to be done.



J-50 This heavy-duty, 60-lb. Jackhamer is best suited for drilling vertical holes up to 20 feet deep—in shaft sinking, excavation, road building and quarry work. It also makes an excellent light-weight drifter when used with Carset Jackbits.

J-40 This powerful, 50-lb. Jackhamer readily handles heavy-duty jobs in mines, excavation, trench and road work where the drill must be lifted or carried frequently. The J-40 with the JL4 Jackleg and Carset Jackbit combination is ideal for stope drilling in mines.

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J-10 This 14-lb. Utility Jackhamer, complete with automatic rotation and hole blowing has many applications for light-duty drilling and can also be used with Carset steels, chisels, gouges, moil points and star drills.

CARSET JACKBITS All Jackhamers drill greater footage per man hour when Carset Jackbits are used. These I-R super-bits, tipped with tungsten carbide, outlast steel bit usages by as much as 400 to 1 — have negligible gauge wear — practically eliminate bit changes — maintain uniformly high drilling speed for the full depth of the hole.

635-5

FOR COMPLETE INFORMATION on all of these Ingersoll-Rand Jackhamers, write for your free copy of Catalog No. 4096.

Ingersoll-Rand

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RESEARCH KEEPS **B.F.Goodrich** FIRST IN RUBBER

Hauls 33 tons of clay for a penny —now in its 25th year

THIS conveyor belt carries clay, used in making bricks, from a crusher up that steep incline to storage bins. Installed in 1926, this B. F. Goodrich belt has cost the brick company only $18 a year, is still in use, good for many thousand more tons. Here's why this B. F. Goodrich belt can be counted on for years of extra service:

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All fibers put to work—Uniform tension is maintained throughout every step of building the belt. In completed belt, all fibres work together; none "go along for the ride", none is taxed by overload.

Special rubber used—Chemicals developed by B. F. Goodrich are added to the rubber to resist the effects of age. These special anti-oxidizing agents keep the rubber "live" and elastic.

These are some of the reasons B. F. Goodrich can furnish a belt like the one in the picture—one that far outlasts other medium-priced belts, one that makes a record for savings, one that can cut the costs of hundreds of industrial operations. Your local B. F. Goodrich distributor will show you how a BFG belt can save you money. Or write *The B. F. Goodrich Company, Industrial & General Products Division, Akron, Ohio.*

Conveyor Belts BY

B.F.Goodrich

RUBBER FOR INDUSTRY

ENGINEERING AND MINING JOURNAL

VOLUME 152 — 85th YEAR OF PUBLICATION — NUMBER 10

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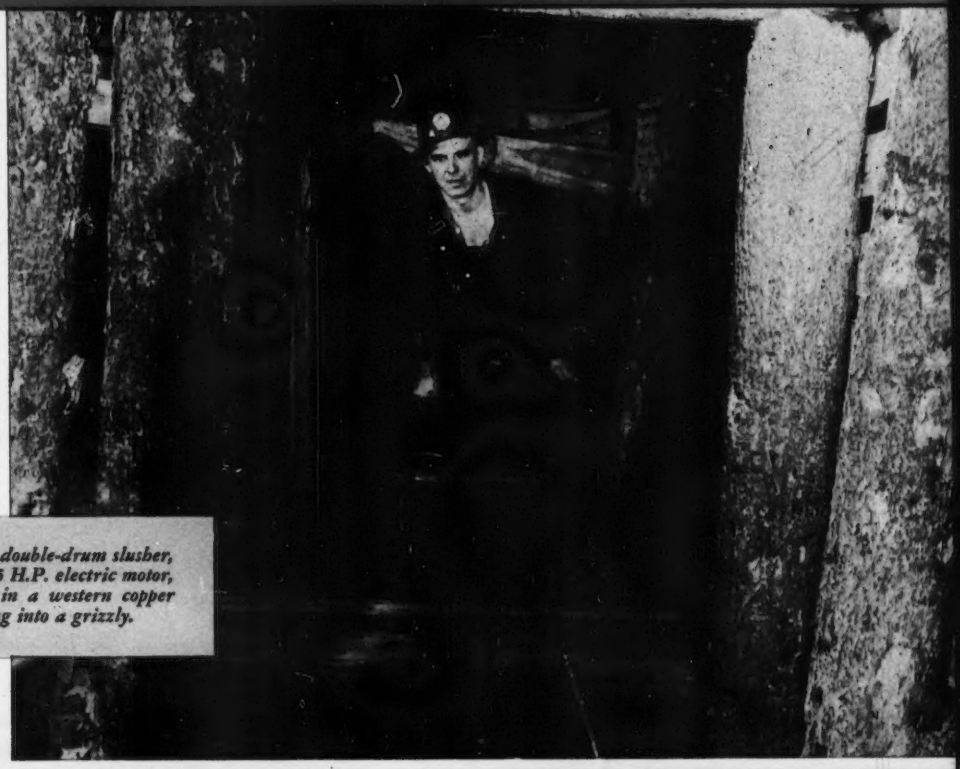
JOY SLUSHERS



Joy AAF-211 double-drum slusher, powered by 15 H.P. electric motor, in operation in a western copper mine, scraping into a grizzly.

Joy E-111 Turbinair single-drum hoist on a timber setting operation in a large western mine.

Joy HL-3 Shovel Loader mucking out a drift round in a western copper mine.

Built with JOY'S intimate knowledge of mining problems... they're scraping millions of tons of muck every year

Turbinair driven 5 H.P. S-211 slusher scraping ore in a stope in a western fluorspar mine.

Electric driven CFA-211 double-drum slusher in operation in a Tennessee zinc mine.

25 H.P. B-312 electric slusher scraping ore in a large western Canadian mine.

Ruggedly built to stay underground longer, JOY Slushers stand up under the heaviest loads and toughest conditions to give you that high efficiency found only in machines which are *designed* for the job and *proved* in the mine. Check these features: they assure more tonnage scraped per shift and longer life with less maintenance.

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9. Simple clutch adjustment
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● There's a JOY Slusher in a size and type for every scraping job. You need only to consult a Joy Engineer to get your answer. He can recommend the best loading equipment for your needs because Joy manufactures the only *complete* line of rock loading equipment for mines . . . slushers, track-mounted shovel loaders, and continuous-type trackless loaders.

WRITE FOR BULLETIN 76-Y

Consult a Joy Engineer

W&D M33

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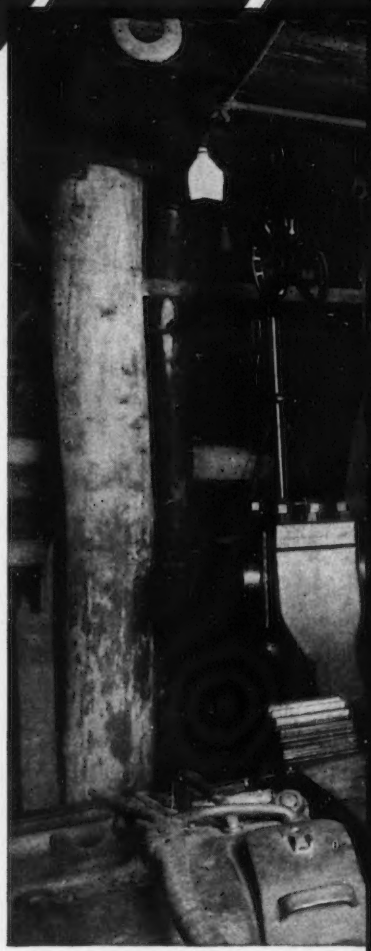
WIRE ROPE STRENGTH

when you lubricate with TEXACO CRATER



ABOVE or below ground, wire rope lubricated with *Texaco Crater* stays strong longer. That's because *Texaco Crater* protects it against wear, rust and core rot. This famous lubricant, properly applied, thoroughly *penetrates* the rope . . . coats each metal strand with a tough, long-lasting film . . . surrounds and preserves the core.

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On your car wheel bearings, use long-lasting *Texaco Olympian Grease*. It assures easier starts and smoother operation the year 'round.

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TEXACO STAR THEATER
starring
MILTON BERLE
on television
every Tuesday night.
See newspaper for
time and station.

TEXACO

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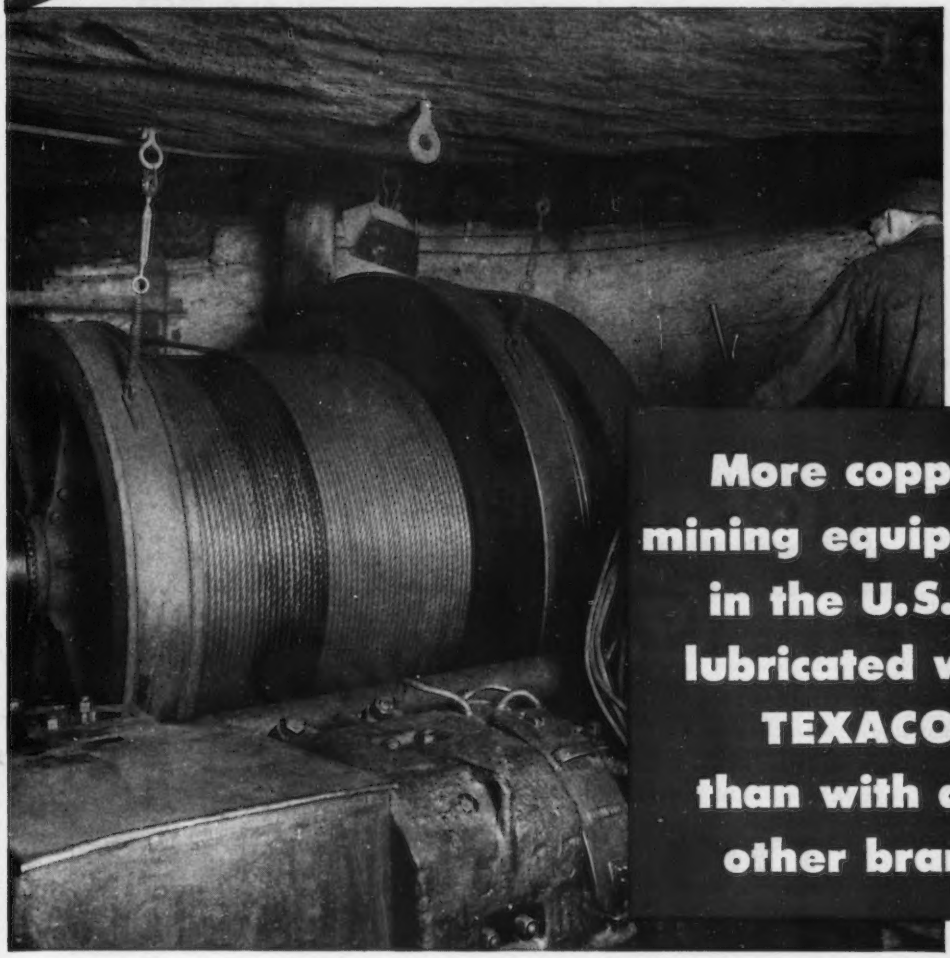
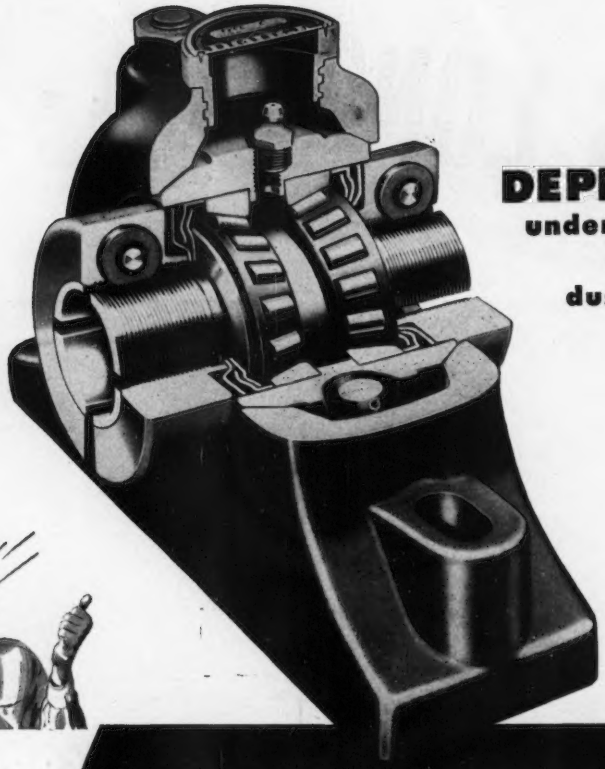


More copper mining equipment in the U.S. is lubricated with TEXACO than with any other brand

Lubricants and Fuels

FOR THE MINING INDUSTRY



DEPENDABLE
under severest conditions of dust and dirt!

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- Even under layers of grime, dirt and abrasive dust encountered in many production operations, the Dodge-Timken Type C bearing carries its power load smoothly, efficiently, without interruption—because it's
- Triple-sealed to prevent the entry of dust, however fine. Accurately machined steel seals keep dirt *out* and lubricant *in*.
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SOLID STEEL CONVEYOR PULLEYS

Save time on Pesky Jobs

with the 18-pound Le Roi-CLEVELAND

Hornet Rock Drill

H-22 HORNET FEATURES

- Weight — 18 lbs.
- Powerful blowing
- Strong rotation — easy holding
- Both wet and dry types
- Conventional rifle-bar rotation (3 pawls)
- Replaceable spacer bushing
- Spade or Tee handle
- 2-piece chuck and rotating sleeve
- Lubrication pocket in handle
- Chuck size 7/8" hex x 3 1/4" — adapters too
- Drop forgings for major parts

. . . and your miners can put more work on production

The H-22 Hornet is a terrific little rock drill. It weighs only 18 lbs., but it has all the design features found in larger Le Roi-CLEVELAND machines. That is why, pound for pound, you can't beat it for drilling speed.

And here's what your miners can do with it—easily and quickly, without strain: Drill holes for trolley hanger bolts. Clean up roof. Clear out rock falls. Brush bottom. Drill oversize pieces at the grizzly. Cut hitches. And a thousand and one other odd jobs.

Because the H-22 Hornet is so light, and drills so fast for its weight, your miners get these tasks done in a hurry — more time can be spent on production; your costs look better. So equip your miners with Le-Roi CLEVELAND Hornets. Complete information is available — just write for it.

LE ROI COMPANY

RD-34

CLEVELAND ROCK DRILL DIVISION
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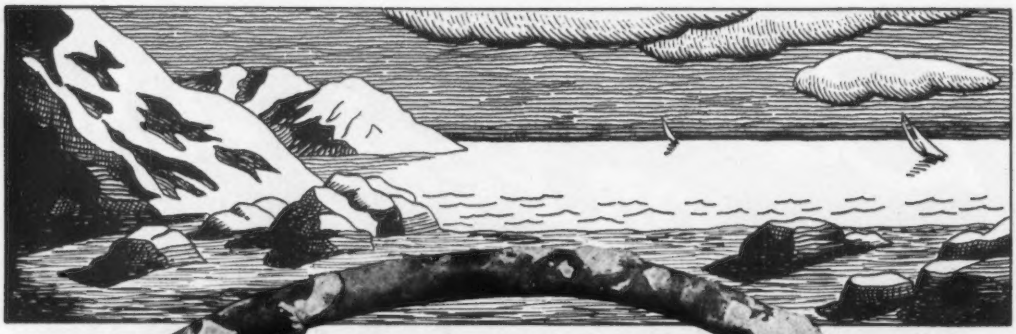

NEITHER SURF, NOR ROCKS, NOR BARNACLES....

This "beat-up" looking piece of TIREX Cord is a veteran of many battles with the sea. Here's an excerpt from a field report describing its performance.

> "TIREX Cords and Cables have been found to be the only product that can be counted upon to withstand consistently the severe abuse to which they subject cables in their research work. One instance was given: A TIREX Cord led from a heavy instrument located on the ocean bottom several hundred yards from the shore, through the surf and over a rocky water line to the point where they were taking readings. After an unexpected storm they found this heavy instrument cast far up on the beach with the cord still attached, but in a tangled mass. The instrument was a total loss but the cord was intact and was used again on many subsequent occasions without requiring repair."

Isn't that the kind of service you want from your portable cords and cables? Of course it is! You can be sure to get it if you specify and be sure you get Simplex-TIREX Cords and Cables. They're a product of Simplex Research.

Simplex Research gave you the first heavy duty, rubber-jacketed portable cord or cable; the first low water absorption insulation; the first rubber-jacketed underground cable. Besides these notable "Firsts" Simplex Research has provided a great many developments which have enriched the art of cable design.

TIREX is not made nor recommended to be used under water. However, the spectacular life of this TIREX Cord illustrates perfectly the inherent ruggedness of TIREX. This ruggedness has been deliberately built into all TIREX Cords and Cables. It is one of the "plus values" that you get when you use TIREX.

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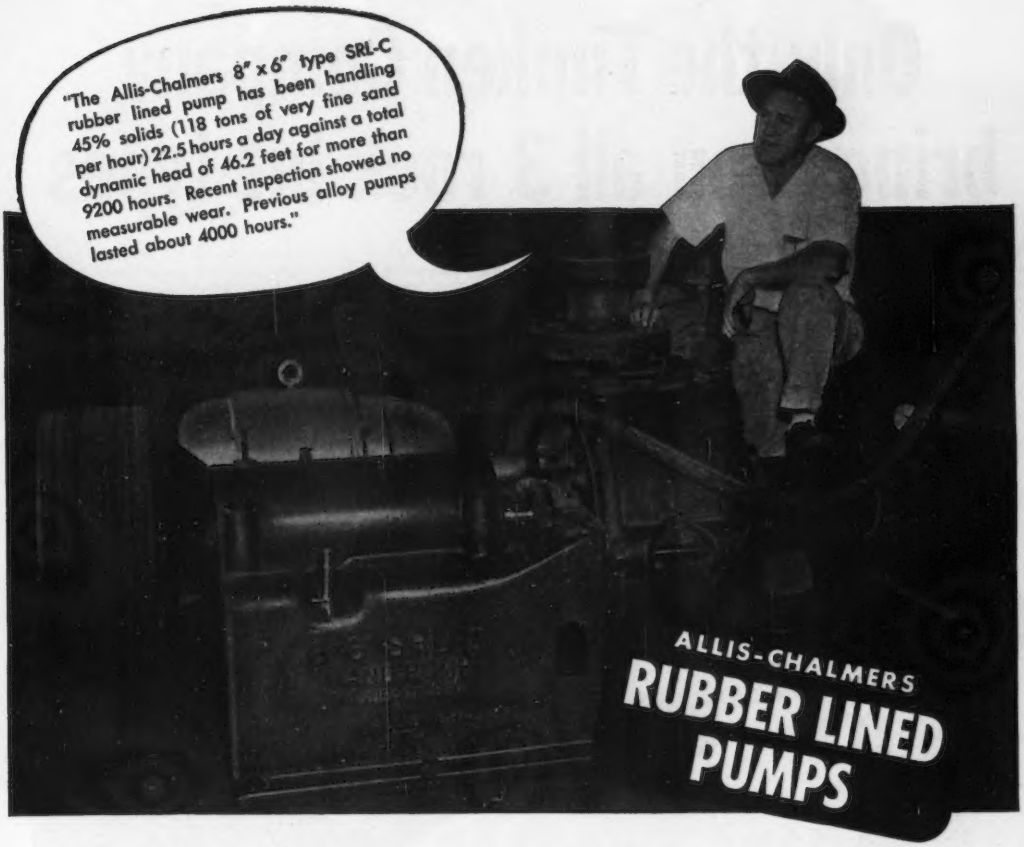
"The Allis-Chalmers 8" x 6" type SRL-C rubber lined pump has been handling 45% solids (118 tons of very fine sand per hour) 22.5 hours a day against a total dynamic head of 46.2 feet for more than 9200 hours. Recent inspection showed no measurable wear. Previous alloy pumps lasted about 4000 hours."
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RUBBER LINED PUMPS

9200 HOURS HANDLING SAND

"No Wear"

HANDLING FLORIDA SAND mixed with rutile, ilmenite, zircon and monazite will grind any metal pump to pieces in short order. But this Allis-Chalmers rubber lined pump has been operating for more than a year with no measurable wear. 10 to 50 times the service life of the best metal alloy pumps is not an uncommon record.

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Rubber lining compounds are especially engineered for each application. Linings are bonded to steel frames and not to the pump body. Linings may be replaced without removing the pump from its location. The impeller is equally easy to remove and replace.

If you are pumping fine mesh, hard, abrasive materials (⅛" to 325 mesh size), you may find that an Allis-Chalmers SRL rubbed lined pump will mean longer life and lower costs per gallon pumped. Ask your nearby Allis-Chalmers District Office representative, or write Allis-Chalmers, Milwaukee 1, Wis. and ask for Bulletin 08B7311.

A-3476

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1. ONE-USE "SPIRALOCK". To use where reconditioning is not feasible. Gives lowest unit cost. "Spiralock" union holds bit on dependably, permits easy removal.

2. CARBIDE INSERT. For drilling extremely hard and abrasive ground, small holes, extra deep holes. Holes go down faster, bit reconditioning is simplified.

3. MULTI-USE. Gives lowest cost per foot of hole when full increments of drill steel can be drilled and when control and reconditioning of bits are correct.

...and a complete Rock Bit Engineering Service

WANT an unbiased recommendation on the type of rock bits to use for your job? Then ask the Timken Company—the *only* rock bit manufacturer who makes all three rock bit types . . . multi-use, carbide insert, and one-use!

The Timken Company has had 19 years' experience in solving rock bit problems. And with all three bit types to draw upon, our Rock Bit Engineering Service can help you select the one bit that's best for you, whether you're looking for lowest bit cost, lowest cost per foot drilled, greatest possible drilling speed, or any other desired advantage. For information and help, contact The Timken Roller Bearing Company, Rock Bit Division, Canton 6, Ohio. Cable address: "TIMROSCO".

FREE BOOKLET! *Shows full line of bits with detailed descriptions, plus other useful rock bit data. Write for your copy.*

your best bet for the best bit for every job

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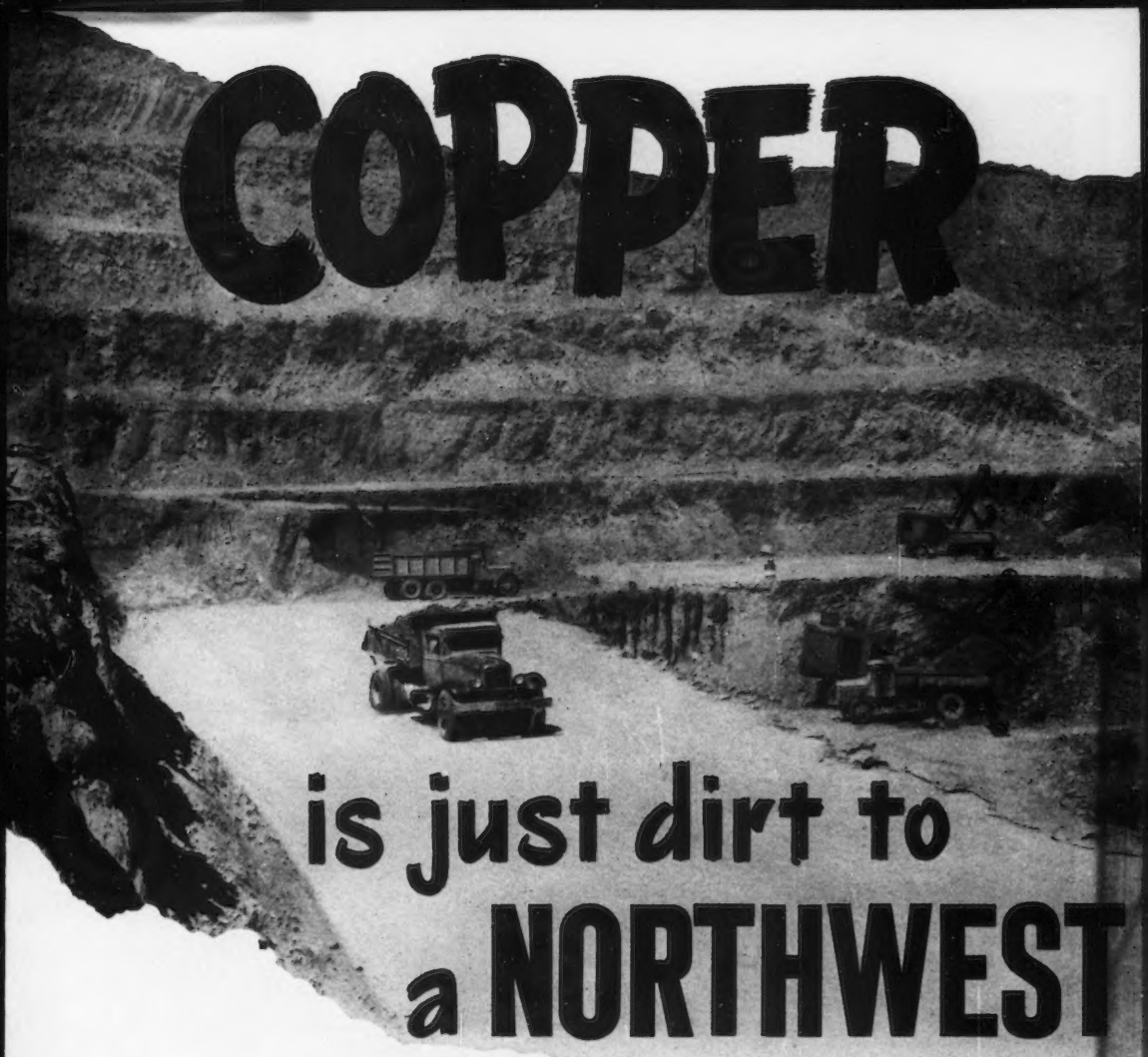
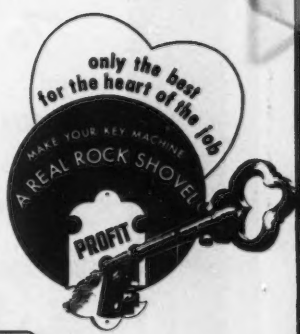


is just dirt to a NORTHWEST

And, so is every other kind of digging whether it is Rock or Loam. If you have a real Rock Shovel you are assured of output in any digging.

Here are three Northwests in one of the largest copper pits in the world keeping the trucks on the move. They are proving the value of such Northwest advantages as Northwest Positive Traction, the "Feather-Touch" Clutch Control, the Northwest Cushion Clutch, Northwest Dual Independent Crowd and Northwest Simplicity of Design that makes upkeep easy and reduces "down time." These things are proving out in mining and hard rock work.

If you are planning modernization, expansion or additions in your pit you will find that Northwest advantages will speed up your output and cut your pit costs. Why not plan now for a fully Northwest equipped pit? We'd like to tell you more about Northwest Advantages and what Northwests are doing for other mining properties.



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NORTHWEST

Convertible for any Mining Material Handling or Excavation Problem

To insure lowest cost per yard moved, or ton lifted . . . compare all excavator and crane information with "KOEHRING WORK CAPACITY". Your Koehring distributor has specific figures that will let you prove for yourself the biggest profit-earning value. K124

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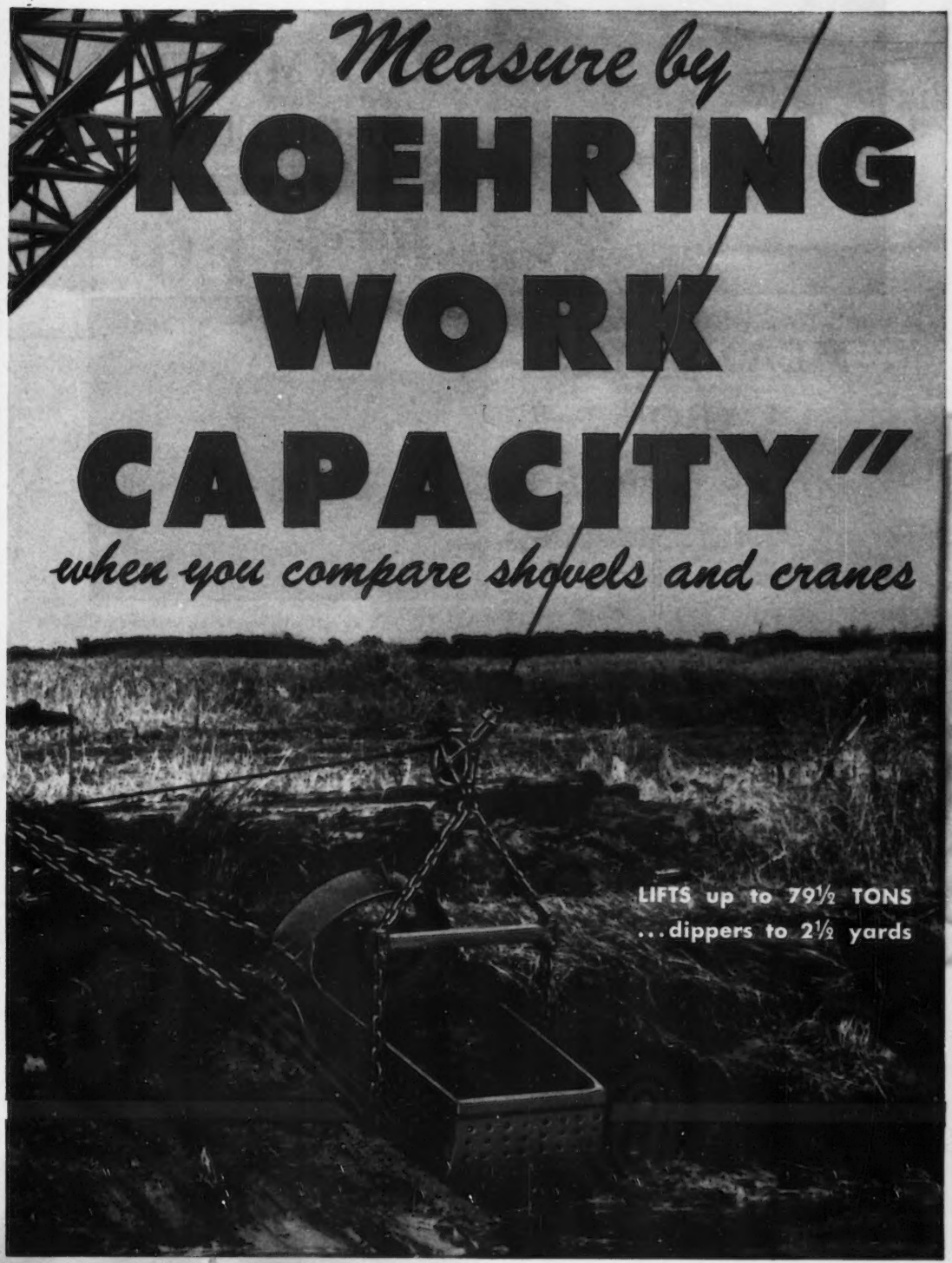
Measure by
KOEHRING
WORK
CAPACITY"
when you compare shovels and cranes
LIFTS up to 79½ TONS
...dippers to 2½ yards

ROCKMASTER SHOOTING

Here

MEANS LESS LABOR

on the Grizzly

EVEN if labor and other costs weren't rising, there still would be no sense in paying for more work on the grizzly than is absolutely necessary.

That's why alert mine managers are giving increased attention to getting improved breakage in primary blasting—so that most secondary blasting can be eliminated. Pop shots and other work on the grizzly are being greatly reduced by modern methods of getting better fragmentation at the face —through the ROCKMASTER Blasting System.

One manager reports that he formerly had two men working full time on the grizzly, but now, thanks to ROCKMASTER methods of loading and firing, he needs only one man working part time. Another says he has been able to eliminate all work on the grizzly except on rare occasions.

But fragmentation isn't the only benefit of ROCKMASTER blasting. Modern ROCKMASTER methods can bring you true control over throw, savings on drilling and dynamite and a drastic reduction of noise and vibration. All this adds up to substantial savings in time, material and manpower . . . which means more production per day at less cost.

We'll be looking for you at the Metal Mining Convention in Los Angeles, October 22, 23, and 24. Atlas headquarters will be in the Biltmore, too.

ROCKMASTER: Reg. U. S. Pat. Off.

ATLAS EXPLOSIVES

"Everything for Blasting"

CHEMICALS ATLAS EXPLOSIVES

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HELP YOURSELF TO STAYING POWER!

A "Caterpillar" Diesel D13000 Engine powers the 1½-cu.-yd. Link-Belt Speeder shovel, loading iron ore into a "Cat" No. 80 Scraper pulled by a "Cat" D8 Tractor. The unit is owned by The Hodge Mining Company and is being operated in their open pit near Canton, Ga. Owner John W. Hodge says: "They're light on repairs, easy to handle and easy on fuel and oil."

THE PRESSURE'S ON! Our country is under way in a tremendous defense effort—and everyone has a job to do. Yours is important. Military and civilian needs call for an estimated $2.8 billion production from the mining industry this year. *And as much or more, next year!*

It's going to be a long pull for men and *machines*. Will *your* equipment stand up? *Much of it must!* Military and Defense Rated Orders must be filled first, so obtaining new machines may take longer than you had planned. But you can easily help yourself to many extra hours of equipment life!

How? If you have "Caterpillar" Diesel Engines, Tractors, Motor Graders or Earthmoving Equipment, you're in a good spot. These units are rugged—and you've got a live-wire partner in your "Caterpillar" dealer. Anticipate your replacement parts needs *before* parts are worn beyond repair. Talk these needs over with him. He is qualified to give competent opinion. If he can't replace, he may be able to rebuild the original part. He has a top-notch service staff and facilities. He'll do his utmost to keep your equipment on the job!

CATERPILLAR TRACTOR CO., PEORIA, ILLINOIS

You're the Doctor

Due to overheating, freezing, scale deposits, filling a hot engine with cold water, pulling heads down too tight, or other poor maintenance practices—cylinder heads may crack. Your "Caterpillar" dealer is able to repair most cracked cylinder heads. In addition, he can replace worn valve seats with valve inserts and restore the rocker arm mechanism to serviceable limits. Consult your Operator's Instruction Book for proper cooling system and valve maintenance.

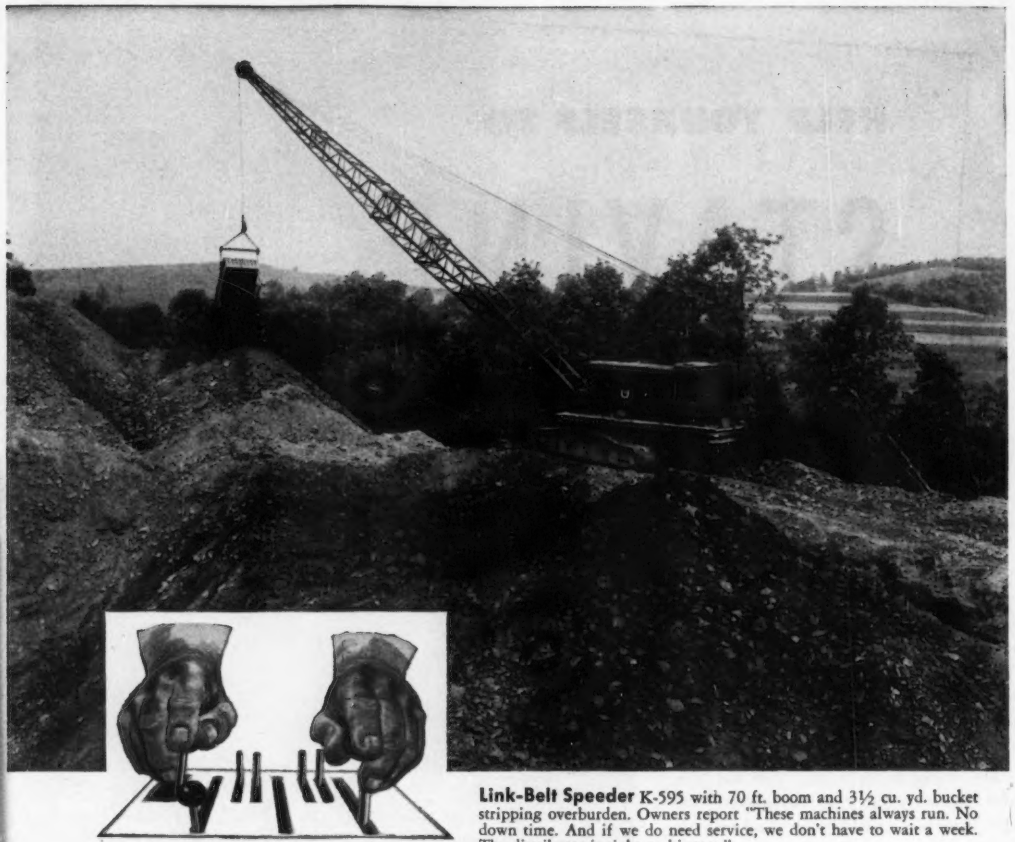
REREAD YOUR OPERATOR'S INSTRUCTION BOOK

Good care can add many extra hours of equipment life.

CATERPILLAR

REG. U. S. PAT. OFF.

DIESEL ENGINES • TRACTORS • MOTOR GRADERS • EARTHMOVING EQUIPMENT



Link-Belt Speeder K-595 with 70 ft. boom and 3½ cu. yd. bucket stripping overburden. Owners report "These machines always run. No down time. And if we do need service, we don't have to wait a week. The distributor is right on his toes."

AT YOUR FINGER TIPS...

up to 25% increased output

WITH SMOOTHER, EFFORTLESS *Speed-o-Matic* CONTROLS

LINK-BELT SPEEDER

Fingers instead of muscles do the control-work on the Link-Belt Speeder K-500's. That's why operation of this Shovel-Crane is faster, surer, and easier. You get time-saving precision, too . . . "pin-point" placement of bucket, shovel or hoe, without drag, lag, jerk or jump. Control is perfect . . . you "feel" the load every inch of the way.

Operators praise the ease Speed-o-Matic power-hydraulic controls provide. Say they keep fresher, more alert even during long overtime. This pays off in greater output . . . up to 25% and more, and the kind of profits you like to see.

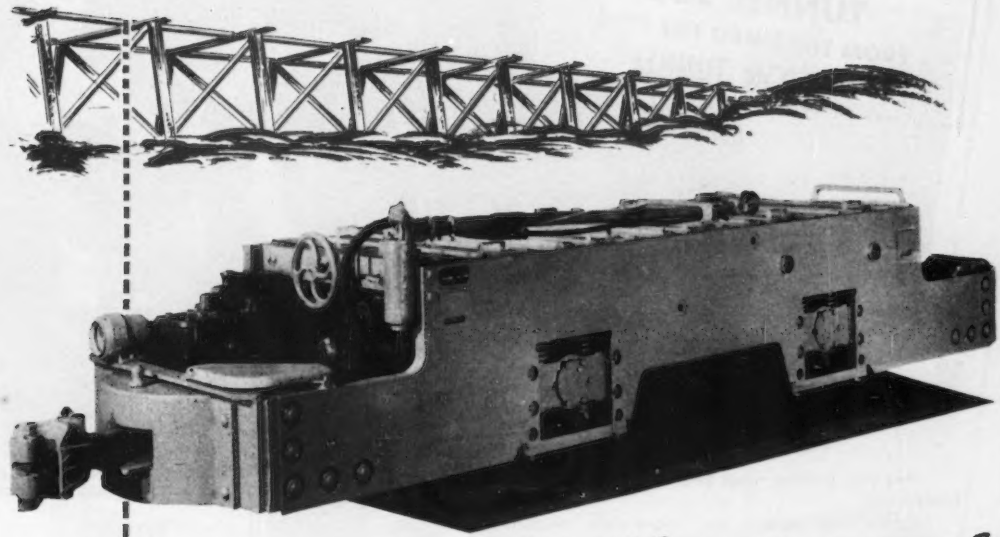
Introduced in 1936, Speed-o-Matic power-hydraulic controls have proved their superiority under toughest field conditions. They are typical of the many advanced features which make the K-500 the standout performer in its class. Depend on Link-Belt Speeders. They handle more work, more kinds of work, more of the time.

LINK-BELT SPEEDER
CORPORATION

12,571-A

Builders of the most complete line of shovels, cranes and draglines
CEDAR RAPIDS, IOWA

Are Goodman Locomotives RUGGED?



You be the judge!

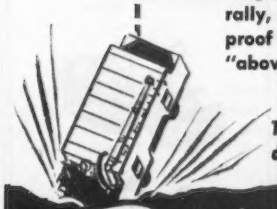
Recently, at a large metal mine, a Goodman 10-ton haulage unit like the one shown fell from an outside trestle and dropped, controller end first, thirty feet to the ground.

Despite the fact that it dove into a fairly solid fill to a depth of 4 feet, the locomotive suffered no damage except a broken pressure gauge. *It was out of service only for the time required to replace it on the track.*

We knew this locomotive was tough, but not *that* tough. So naturally, we're pleased to report this proof of its ability to take punishment "above and beyond the call of duty."

But this locomotive is more than just tough. It's a brand new Goodman design that provides a 10-ton haulage unit having two 60 hp. motors and *a single reduction spur gear drive for 24" gauge.* All of which means power for heavy hauls, narrow width for passing rotary or Granby dumps, plus a sufficiently low height for use under ore chutes.

It has other desirable features, too, such as: hydraulic brakes, roller bearing journals, camtactor control, sealed beam headlights, transverse equalizers and — it can be built for 24" to 36" gauge, or 30" convertible to 24".



This durable locomotive is worth investigating for dependable service in your mine. Write for information.

AT THE LOS ANGELES CONVENTION OCT. 22-24 —for a discussion of your mine haulage, or just for relaxation, you are welcome to visit Goodman headquarters at the Biltmore Hotel

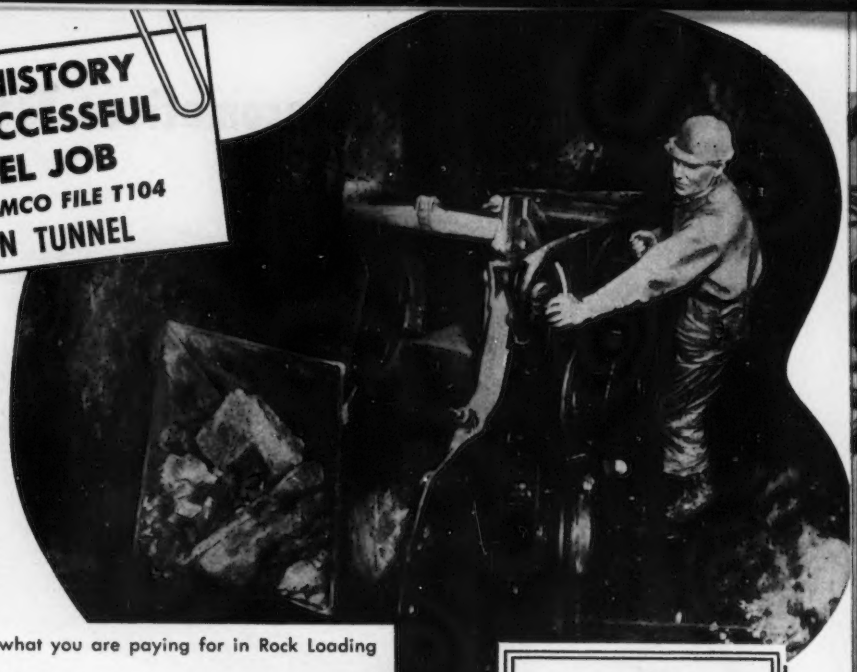
Goodman MANUFACTURING COMPANY

HALSTED STREET at 48th • CHICAGO 9, ILLINOIS

CASE HISTORY OF A SUCCESSFUL TUNNEL JOB

FROM THE EIMCO FILE T104

CARLTON TUNNEL

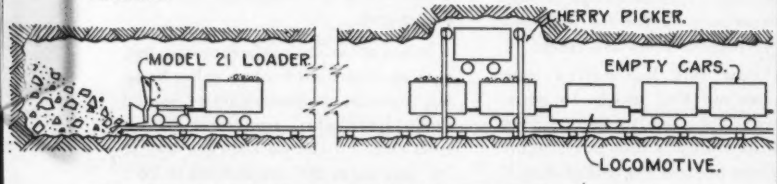


Are you getting what you are paying for in Rock Loading Equipment?

Eimco rock loaders are heavy-duty machines, so highly regarded by the users in the field that their price value on the second hand market is often the same as prices quoted for new machinery advertised as "the same as" or "as good as" Eimco's.

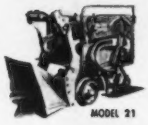
Only one important reason can be responsible for this leadership — that Eimco, as the only successful pioneer of this type of equipment, has retained its leadership by building quality machinery. Quality machinery means: heavier in construction, less maintenance, easier operation, more dependability, lower air consumption and all the other items you can think of when you consider a better grade of machinery over a cheaper article.

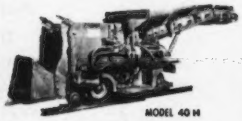
The Carlton Tunnel — driven to dewater the valuable mining claims in the Cripple Creek district of Colorado. Total length 32,267 feet. Tunnel size 10' x 11'. Average depth round 7.14 feet. Rounds in good ground averaged 8' and 9' mucking time less than an hour. Best month 1870 feet, best day 78', mucking machines—Eimco Model 21's.

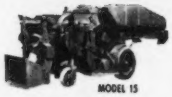


Carlton Tunnel used the "cherry-picker" method of car switching with the overhead lift equipped with an air cylinder. The cherry-picker was mounted on skids so that it could be moved forward, by the locomotive, as required.

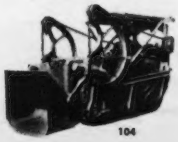
MODEL 12-B


MODEL 21


MODEL 40 H


MODEL 15

102


104

EIMCO

THE EIMCO CORPORATION

The World's Largest Manufacturers of Underground Rock Loading Machines

EXECUTIVE OFFICES AND FACTORIES — SALT LAKE CITY 10, UTAH, U. S. A.

BRANCH SALES AND SERVICE OFFICES:

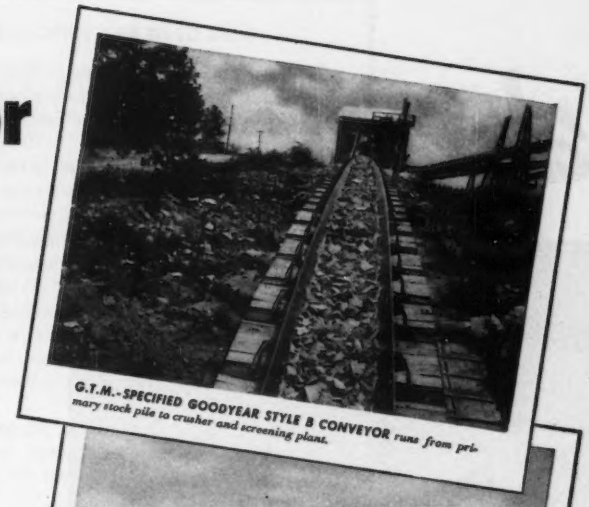
NEW YORK, 51-52 SOUTH STREET • CHICAGO, 3319 SOUTH WALLACE STREET
BIRMINGHAM, ALA., 3140 FAYETTE AVE. • DULUTH, MINN., 216 E. SUPERIOR ST.
EL PASO, TEXAS, MILLS BUILDING • BERKELEY, CALIFORNIA, P. O. BOX 240
KELLOGG, IDAHO, 101 DIVISION STREET

IN FRANCE, SOCIETE EIMCO, PARIS, FRANCE
IN ENGLAND, EIMCO, GREAT BRITAIN, LTD., LEEDS 12, ENGLAND
AGENTS IN ALL PRINCIPAL CITIES THROUGHOUT THE WORLD

6252

at hard labor on the ROCK PILE

At Clark Hill Dam—$60,000,000 triple-purpose dam now under construction on the Savannah River—all aggregate rides from quarry to dam site on a 16-belt conveyor system. Here, as in outstanding construction projects the country over, conveyor belts specified by the G. T. M. —Goodyear Technical Man—are giving long, low-cost service.



G.T.M.-SPECIFIED GOODYEAR STYLE B CONVEYOR runs from primary stock pile to crusher and screening plant.

FROM CRUSHER TO STOCK PILES, sized aggregate is stock-piled by shorter conveyors belted according to the G.T.M.'s specifications.

UPGRADE from stock piles to mix plant, all aggregate rides this Goodyear Style B conveyor.

GOODYEAR INDUSTRIAL RUBBER PRODUCTS
GIR-Specified
STYLE B CONVEYOR BELT
FOR AGGREGATE HANDLING SYSTEM
A
Tough cover resists cutting and abrasion
B
Multi-plies of mildew-inhibited duck, friction coated
C
Breaker strip available when specified
D
Cover of tough, abrasion-resisting rubber
Available in 28 to 48 oz. duck; 3 to 10 plies; widths from 14" to 42" in stock sizes, other sizes to order; full range of cover gauges.

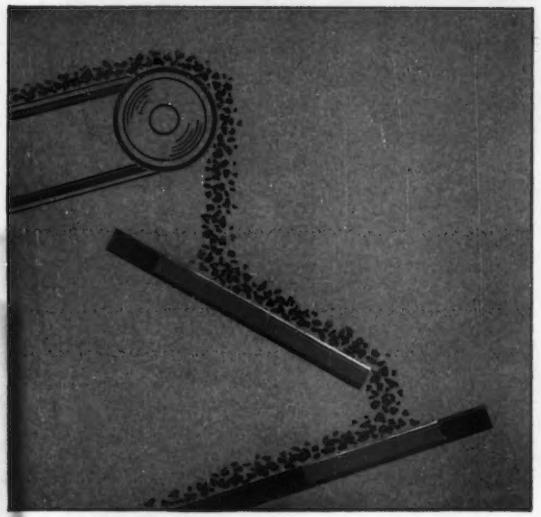
FOR HOSE, FLAT BELTS, V-BELTS, MOLDED GOODS, PACKING, TANK LINING, RUBBER-COVERED ROLLS built to the world's highest standard of quality, phone your nearest Goodyear Industrial Rubber Products Distributor.

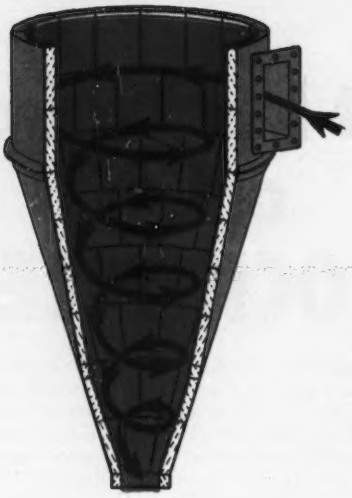
We think you'll like
"THE GREATEST STORY EVER TOLD"
Every Sunday—ABC Network

GOODYEAR

THE GREATEST NAME IN RUBBER

abrasion?





erosion?

Here are even tougher

The weak link in keeping certain equipment on the production line often lies in rapid abrasion and erosion of vulnerable areas. For example:

In Cyclone Dust Collectors where there's a ceaseless blast of highly abrasive particles.

In Coke Chutes and Hoppers which must withstand constant cascades of fiery coke or cold coke.

In Hot Blast Mains through which dust-laden gases travel at high velocities.

In Billet Heating Furnaces through which hundreds of massive metal slabs are pushed.

Under conditions like these, metals, paving bricks and other normally durable materials are simply worn away — and in very short order. It takes exceptionally tough linings or bearing surfaces — as provided by our MONOFRAX K fused cast blocks or our CARBOFRAX silicon carbide bricks and shapes — to stand the gaff.

Both these Super Refractory materials by CARBORUNDUM *are within one index point of diamond hardness!* It is this hardness that gives these Super Refractories their exceptional resistance to abrasion—from room temperature to high heats.

Granted, abrasion is seldom an isolated condition. It's usually abrasion *plus* . . . heat, or acid attack, or some other condition. But, as you can see (top, opposite page), these Super Refractories have many other properties, equally as desirable as abrasion resistance and equally important in certain applications.

Information is now available on all the various groups of Super Refractories by CARBORUNDUM. Just send the coupon and you'll receive our new booklet. No obligation, of course.

THE CARBORUNDUM COMPANY

Refractories Division **Perth Amboy, New Jersey**

"Carborundum," "Carbofrax," "Monofrax" and "Alfrax" are registered trademarks which indicate manufacture by The Carborundum Company.

SUPER REFRACTORIES ARE ALSO USED

WHERE HEAT CONDUCTIVITY IS NEEDED. At elevated temperatures CARBOFRAX refractories conduct heat as rapidly as chrome-nickel steels! This characteristic is invaluable in checkers, muffles, hearths, etc.

WHERE CHEMICAL ACTION IS PRESENT. In general, all Super Refractories are either neutral or acid in nature — are widely used where chemical inertness is important.

WHERE STRENGTH IS IMPORTANT. No commercial tonnage refractories have greater strength than Super Refractories. All can withstand over 300 psi at 2750° F without crushing.

WHERE HIGH HEAT IS INVOLVED. They can be safely used at temperatures over 3000° F. They are very durable — are highly resistant to spalling and cracking. Some varieties are almost indispensable where flame impingement or violent temperature changes are present.

WHERE INSULATION IS NEEDED. One of these products, ALFRAX BI aluminum oxide material, consists structurally of many hollow spheres. It's one of the best insulating materials at very high temperatures.

WHERE SPECIAL SHAPES ARE INDICATED. Practically all Super Refractories are available either as bricks or special shapes molded to close tolerances — including fitted joints, tubes, etc.

Do any of these suggest possible applications?

materials of construction than grinding wheels

The important thing about Super Refractories by CARBORUNDUM is NOT just that they are "better" than standard fireclay refractories. The important thing is that they are actually *a class apart* — with many entirely different properties and applications. (For example, some of their properties — such as abrasion resistance — are important *regardless of whether high temperatures are involved.)*

Nor is their principal value simply that they cure trouble-spots where other materials (e.g., refractories, metals, etc.) fail to stand up. Their value usually lies in increasing capacity and reducing overall operating costs. (For example, regenerator checkers made of CARBOFRAX brick absorb and release over 3 times as much heat as checkers made of ordinary refractories when cycles are short.)

WHY NOT CHECK UP? We have a new booklet which outlines the unusual characterictics of these special purpose materials. The coupon will bring you the story — or one of our engineers would be happy to talk over your specific problems. We believe it could be mutually profitable.

This advertisement — one of a series — is presented in the belief that in the unusual properties of the various Super Refractories by CARBORUNDUM lies the key to many new or improved processes. We would like to talk over specific jobs with anyone who sees such possibilities.

Dept. U-101
Refractories Div., The Carborundum Co.
Perth Amboy, New Jersey

Please send your free booklet on properties of Super Refractories

Name_____

Position_____

Company_____

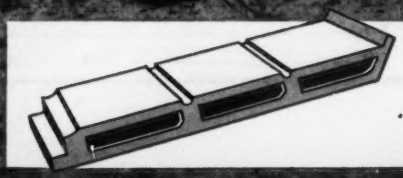
Street_____

City_____ **Zone**____ **State**_____

TOURNAROCKER design.

Dump is fast and safe. With power on front wheels, Tournarocker backs to edge of spill, sets rear-wheel scraper, dumps big load quickly, and moves off for another load.

Tournarocker—Trademark PQ13



Tournarocker body is all steel . . . the front ¾", the sides ½" plate. Bottom consists of ½" plate with 1½" billets welded on top at 8" intervals . . . with billets covered by ¾" heat-treated tool-steel strips 8" wide (as shown in cut-away section at left).

To reach this job in the Tehachapi Mountains, the 2 rear-dump Tournarockers were driven 125 miles up heavily-traveled U.S. 6 from Los Angeles. Travel speeds reached 35 m.p.h.

Big 8' x 12½' top opening, plus low rear entry, speed loading of heavy limestone rock. Reinforced all-steel body eliminates a lot of loading shock damage and maintenance troubles.

. . pays off in cramped, mountain-face quarry

Monolith Portland Cement Co. tries one . . . buys two!

For hauling rock in the cramped quarters of their mountain-face limestone quarry at Monolith, Calif., the Monolith Portland Cement Company recently rented a high-speed, 16-ton C Tournarocker. The rubber-tired rig's speed and maneuverability in moving over winding mountain roads, and the ease with which it moved in and out of restricted loading and dumping areas, increased production so much that Monolith bought it. Soon afterward, they purchased a second C Tournarocker . . . with these 2 units and 2 six-ton dump trucks, replaced a fleet of 10-ton trucks.

Both Tournarockers are now working with 2½ yd. rock shovels at an altitude of 3800'. In typical operation, each "C" carries 16 tons per load . . . completes five 400' cycles every 50 minutes. Hourly output for the 2 rigs averages 160 tons . . . with the assistance of the two 6-ton dump trucks, ample to keep 2 shovels working at full capacity.

Easy to operate . . . easy on operator

There are a lot of reasons why Tournarockers boosted output. With short 90° turns and 13'9" turn radius, the "C's" spotted quickly at both shovel and spillway! Fingertip electric controls kept operators working at peak efficiency all day . . . big, 4-wheel air brakes — with 940 sq. in. braking surface per wheel — gave them maximum safety and confidence for going downhill at high speeds with a full load. As Operator W. S. Wilkson puts it, "Tournarocker is a good machine . . . fast and sturdy . . . easy to operate."

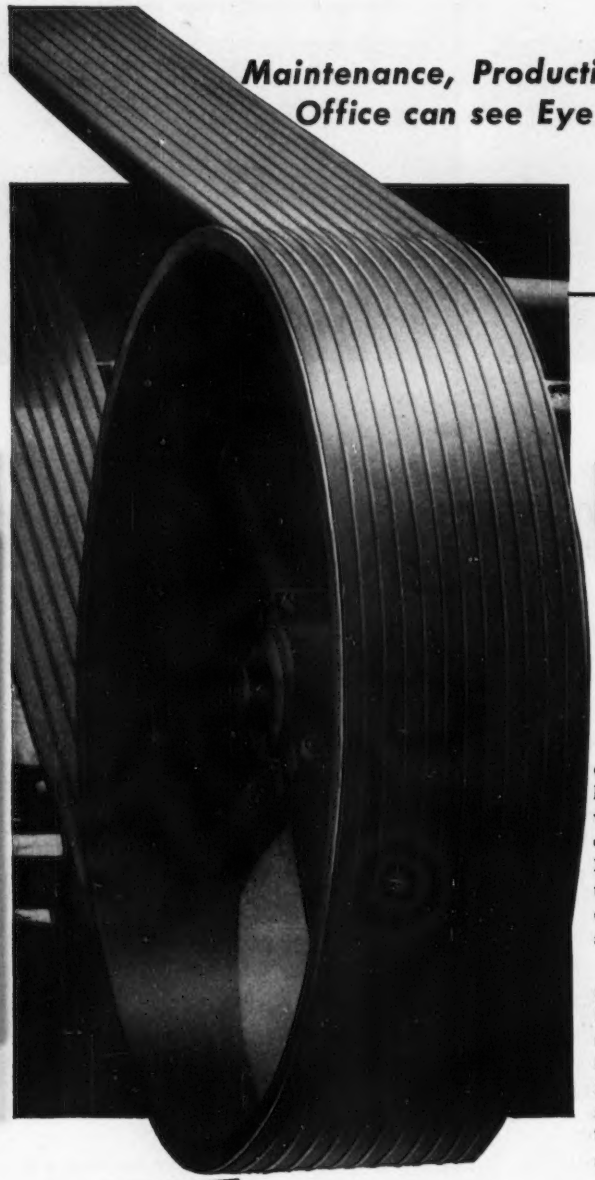
You can prove this performance on your job and increase your rock hauling profits, too. Ask your LeTourneau Distributor for all the details on 9, 18, 35 or 50-ton electric-control, rear-dump Tournarockers.

LETOURNEAU LET EQUIPMENT

R. G. LeTOURNEAU, INC.
PEORIA, ILLINOIS

HIGH-SPEED, RUBBER-TIRED EXCAVATING • HAULING • LIFTING EQUIPMENT

Maintenance, Production, Purchasing and Front Office can see Eye to Eye on this "Baby"



It's a TOUGH, LONGER-LASTING BULL DOG V-BELT!

Yes, a Bull Dog V-Belt has something for everybody. Your engineers and production heads who have enough on their minds already with shortages and the necessity for increased output will appreciate the SPECIALLY ENGINEERED BWH CORD SECTION and its high tensile strength. They'll get the superior load carrying capacity from BULL DOGS and the ability to absorb shock loads that's needed.

Your maintenance men (engineers, too) will note the QUALITY CONTROLLED COMPOUNDS developed by BWH which run cooler and do not crack or deteriorate under severe flexing. They'll probably note also the MINIMUM STRETCH — due to a new and exclusive technique in processing Bull Dog Cords. They'll be *sure* to note the less slippage, fewer adjustments, longer belt life that results.

Your maintenance men will also okay the Bull Dog V-Belt's DURABLE COVERS. They're made of closely woven, heavy, bias-cut fabric that takes the torturous wearing action where the belt meets the sheave — seals it against the penetration of dirt, grease and moisture.

With it all adding up to less money *out* in belt repairs and replacements and more money *in* from maintained and increased production . . . don't you think Purchasing and the Front Office will be glad to go along?

BWH
DEPENDABLE RUGGEDNESS

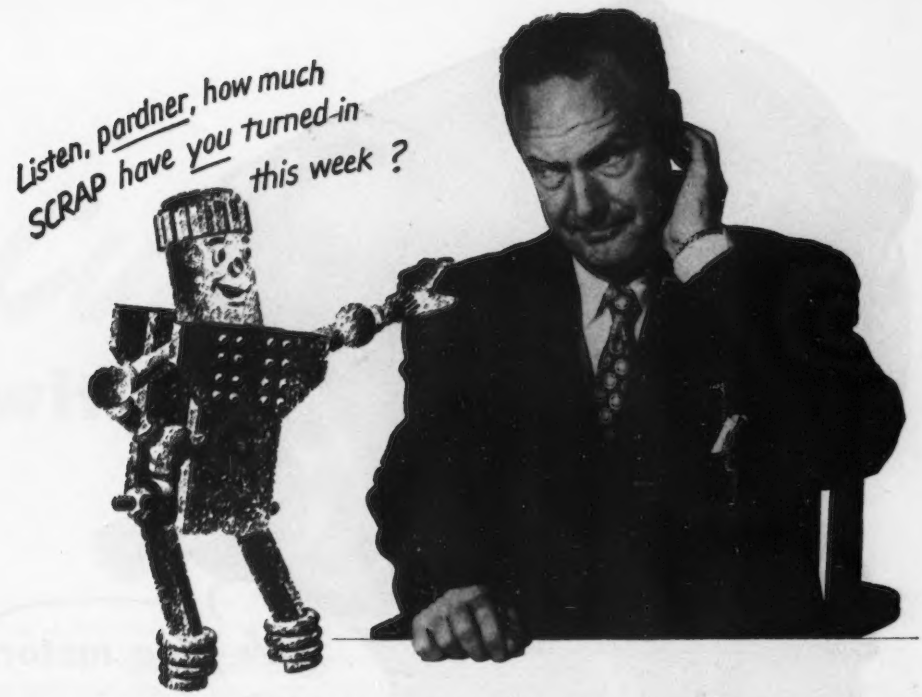
TOUGH PROBLEMS INVITED!
Ask us or your nearest BWH distributor about your power transmission belting, conveyor belting or hose problems. We're specialists in making mechanical rubber products work *better, longer.*

Another Quality Product of

BOSTON WOVEN HOSE & RUBBER CO.

Distributors in all Principal Cities

PLANT: CAMBRIDGE, MASS. • P.O. BOX 1071, BOSTON 3, MASS., U.S.A.



Today, the steel business is your business

—*it needs all your SCRAP, Now!*

SUPPOSE that every steel user were suddenly told that he had to turn in a half-ton of scrap before he could get a ton of steel. It would start the most gosh-almighty treasure hunt for scrap that ever happened.

In effect, this "no-scrap, no-steel" situation virtually exists. For without *all* the scrap that industry can search out and start on its way to the mills, steel production will surely drop. It's as serious as that.

More scrap is urgently needed. Today the mills are turning out more steel than ever before. But they're scraping the bottom of the barrel as far as scrap is concerned. Defense and domestic demands for steel simply cannot be met unless at least 100,000 tons of "purchased" scrap roll into the furnaces—*every day*.

The bulk of this scrap must come from industry. That's why we're asking for your all-out help. That's why it's so important that you make the drive for scrap part of your daily operations. Make it your business to encourage every employee to report any obsolete, broken or worn-out machinery, tool or equipment that has seen its day. From this dormant "junk" must come the heavy melting scrap that the mills need most. Don't let your scrap lie idle; send it on its way. How about it, pardner?

You'll find your local scrap dealers listed in the yellow pages of the phone directory.

This page would ordinarily be used to tell you about

AMERICAN TIGER BRAND WIRE ROPE

but, because without SCRAP we cannot produce steel, we are asking instead for your all-out help in getting more SCRAP to the mills.

AMERICAN STEEL & WIRE COMPANY, GENERAL OFFICES: CLEVELAND, OHIO
COLUMBIA STEEL COMPANY, SAN FRANCISCO
TENNESSEE COAL, IRON & RAILROAD COMPANY, BIRMINGHAM, SOUTHERN DISTRIBUTORS
UNITED STATES STEEL EXPORT COMPANY, NEW YORK

USS

1-1328

UNITED STATES STEEL

WESTINGHOUSE
DO NOT LUBRICATE
Life-Line motor
PAIRED FOR PRODUCTION
Life-Linestarter
WESTINGHOUSE

Cut motor failures with these two

Don't take our word for it. Here's what users of Life-Lines say: "We always have had bearing failures on our pump motors. It was quite an expense in repair costs and down time. Since we installed Life-Line motors, we have had no down time . . . no failures. We now standardize on Life-Lines."

Another user reports: "Our former starters employed solder pot mechanisms. Much trouble was experienced. Since we've switched to Life-Linestarters,® our troubles are gone. The operation of the bimetallic disc is positive."

These reports are two of several hundred such reports resulting from the new kind of dependability built into the Life-Line motor and Life-Linestarter.

Life-Line Motors

Steel frame . . . adds strength, cuts weight.
Pre-lubricated bearings . . . no greasing.
Improved windings . . . lengthen electrical life.

Life-Linestarter

Bimetallic disc . . . calibration unaffected by aging or oxidation.
Servicing is simple . . . all parts front removable.
Screw driver only tool required.

Get the advantages of these two—your best bet to cut motor failures. Ask your Westinghouse representative for copies of "Life-Line Motor Book", B-3842 and "Tomorrow's Starter Today", B-4677, or write Westinghouse Electric Corporation, P. O. Box 868, Pittsburgh 30, Pa.

J-21644

YOU CAN BE SURE . . . IF IT'S Westinghouse

Life-Line

MOTORS and CONTROLS

Cut Cooling Costs

these 3 Ways

1. CUTS INSTALLATION COSTS

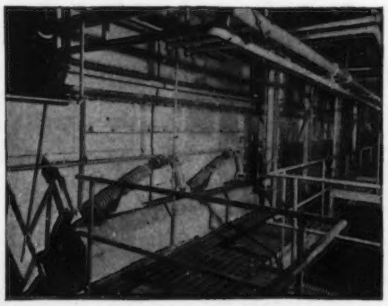
The air-quenching grate cooler comes as a complete unit, fits into existing plants readily because it operates horizontally. Installation costs are 10 to 30 percent less than the cost of installing any other type of cooler! Kiln piers need not be elevated . . . no pit is required beneath kiln.

2. CUTS MAINTENANCE COSTS

Reciprocating motion of grate is carried on flexible rubber bushings and springs. No wearing parts and no slippage. Material does not slide on grate, it hops, gently and steadily. Lubrication is negligible, only four grease fittings on entire cooler. Maintenance cost runs as low as 1/10 cent per barrel.

3. CUTS ROTARY KILN FUEL COSTS

Air-Quenching grate cooler actually returns 75% of sensible heat in material back to kiln as secondary combustion air. Material is cooled quickly, to a temperature where handling is no problem, by means of cooling air coming up through the relatively thin bed of hot material on grate.



4½ by 70 ft Allis-Chalmers air-quenching grate cooler installed in processing plant where it cools large quantities of material from 2500° F to approximately 150° F.

Handles Fine or Coarse Materials

Both fine and coarse materials can be cooled equally well. Need for a supplementary conveyor under cooler is eliminated. Pan conveyor can be added on cooler without need for an additional drive. Get more facts from the Allis-Chalmers representative in your area, or write for Bulletin 07B6368A. Allis-Chalmers, Milwaukee 1, Wisconsin.

Pulverator is an Allis-Chalmers trademark.

ALLIS-CHALMERS

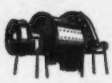
A-3470

Sales Offices in Principal Cities in the U. S. A. Distributors Throughout the World.

Pulverators

Vibrating Screens

Jaw Crushers



Grinding Mills

Gyratory Crushers

Kilns, Coolers, Dryers

IT'S COPPER

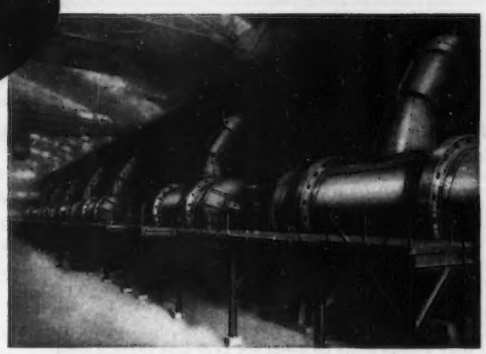
THAT'S PRECIOUS NOW!

Metals needed to defend our rights have become more precious than gold. Increased copper production is essential. But, in the rush to produce more, don't forget that profitable production in the future will require more efficient . . . more dependable . . . machinery than before. Traylor Copper Converters and Casting Wheels are veterans of two world wars. They have proved their worth in times of emergency when maintenance is sometimes neglected under the pressure of continuous production. Do as other leading copper producers have done. Buy Traylor Copper Converters and Casting Wheels to up production . . . *and profits, too!*

TRAYLOR ENGINEERING AND MANUFACTURING CO.
394 Mill Street, Allentown, Pa.
Sales Offices: New York, Chicago, Los Angles
Canadian Mfrs: Canadian Vickers, Ltd., Montreal, P. Q.

Traylor
Rotary Kilns, Coolers and Dryers
Grinding Mills . Crushing Rolls
Jaw, Reduction and Gyratory Crushers
Apron and Grizzley Feeders

ONE 42'0" and two 34'0" circular casting wheels are being built for large South American and South African copper producers. Traylor casting wheels are heavily proportioned, driven by two motors through separate gear trains, but with a single control.



THIS AISLE of 15 Traylor Pierce-Smith type Copper Converters has already entered the fight for increased production. Traylor recently shipped similar converters to South America to boost our supply of copper from Chile.

SEND FOR
OUR LATEST CATALOG
It contains information on all Traylor Mining Machinery. Sign the coupon at right. Mail it today.

Send bulletin 6120 on Traylor Mining Machinery to:

*Name*_____

*Company*_____

*Address*_____

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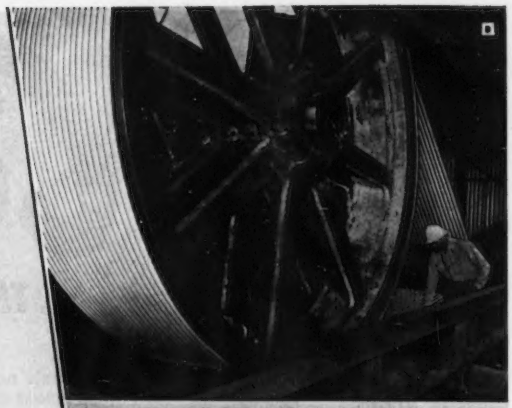
Prove for yourself why Gates Vulco Ropes are giving you longer V-Belt Wear!



Gates Vulco Ropes very competently handle the drive on this immense Jaw Crusher, said to be the largest ever built. It supplies most of the coarse rock for rip rap—and for secondary crushing—on the Detroit Dam project, Detroit, Oregon.

There is a very simple reason why Gates Vulco Ropes—the V-belts built with *concave sides*—are giving you substantially *longer wear*—and you can easily prove this for yourself in just 2 minutes' time!

Pick up *any* V-belt whatever and bend it as it bends when going around a pulley. As the V-belt bends, grip its sides with your fingers—and here is what will happen, every time.

If the belt you are bending is a *straight-sided* V-belt, you can *feel* its sides *bulge out* as the belt bends. This out-bulge forces the sides of the belt to press *unevenly* against the V-pulley—as shown in figure 1-A (see accompanying diagrams).

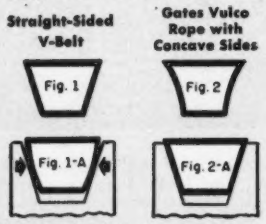
Clearly, this *uneven pressure* against the V-pulley causes the belt to wear *unevenly*—with the wear *concentrated* where the bulge is greatest—and this concentrated wear at one point naturally shortens the life of a *straight-sided* V-belt.

Now, make this same test with the belt that is built with Concave Sides—the Gates Vulco Rope!

Whereas you felt an *out-bulge* when you bent a belt with straight sides, you find that the *Concave Sides* merely fill out and become *perfectly straight*. The sides therefore *press evenly* against the V-Pulley. This distributes the wear *uniformly* across the *full width* of the belt. Naturally, this means longer belt life and *lower* belt *costs* for you!

Only V-Belts made by Gates are built with concave sides. Whenever you buy V-Belts, be sure that you get the V-Belt with the Concave Sides—The Gates Vulco Rope!

What Happens When a V-Belt Bends



How Straight-Sided V-Belt Bulges in Sheave Groove. Sides Press Unevenly Against V-Pulley Causing Extra Wear At Point Shown by Arrows.

The Concave Sides Fill out to a Precise Fit in the Sheave Groove. No Side Bulge! Sides Press Evenly Against the V-Pulley—Uniform Wear—Longer Life!

CS-5110

Gates — Hose V-Belts Molded Rubber Goods for industry

VULCO ROPE DRIVES

ENGINEERING OFFICES AND JOBBER STOCKS IN ALL INDUSTRIAL CENTERS

THE GATES RUBBER COMPANY • DENVER • U•S•A

World's Largest Maker of V-Belts

Move MORE IRON ORE for LESS PER TON

Cost records have demonstrated this fact: where S-A Belt Conveyors can be used underground they will handle more ore at less cost per ton—with greater safety. Experience proved this point at another of the company's mines where operating conditions were similar.

Leading producers of metallic ores the world over depend on soundly-engineered S-A Bulk Materials Handling Equipment for many types of conveying. You, too, can benefit by S-A's 50 years of experience . . . and complete line. An S-A engineer will gladly review your needs for a new system —or additions to your present equipment. *Write us.*

MODERN IRON MINE

Three 36" wide S-A Belt Conveyors are located in the main tunnels at the 1100-foot level. Shaker conveyors and drag line scoops move the ore from the side drifts to the 1415-foot long belt conveyor system. The belt conveyors move ore to a large ore pocket where it is stored until drawn off by the mine skip-hoist bucket which picks up ore below pocket and elevates to the surface.

1901-1951

50 years experience with bulk handling

STEPHEN S-A ADAMSON MFG. CO.

4 Ridgeway Avenue, Aurora, Illinois — Los Angeles, Calif. • Belleville, Ontario

DESIGNERS AND MANUFACTURERS OF ALL TYPES OF BULK MATERIALS HANDLING EQUIPMENT

as for practically every important mineral

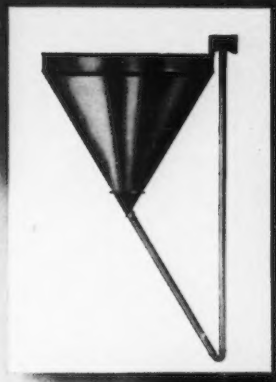
CYANAMID NOW OFFERS CONCENTRATION PROCESSES FOR HEMATITE IN ALL SIZE RANGES . . .

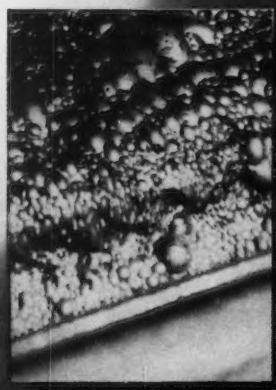
HEAVY-MEDIA SEPARATION	DUTCH STATE MINES CYCLONE SEPARATOR	FROTH FLOTATION
6" x ¼"	⅜" x 65 mesh	65 mesh x 0

Over a decade ago, metallurgists on the Iron Range evaluated Heavy-Media Separation for the concentration of Hematite . . . pioneered commercial use that this year will add over 5,000,000 long-tons of shipping-grade concentrates to the output of the Range. And this important addition to domestic output is being still further increased as other districts adopt Heavy-Media Separation to up-grade brown ores and other low-grade ferrous ores.

Now Range metallurgists pioneer again . . . with commercial operation of two Dutch State Mines Cyclone Separator plants to beneficiate over 150 tons an hour of Hematite fines in the ¼" x 65 mesh size range . . . harbinger of an industry-wide determination to reclaim still more millions of tons of blast-furnace feed.

And, as extensive pilot plant tests have shown, froth flotation of −65 mesh Hematite with Cyanamid Reagents can still further expand our economic reserves, come what may.





What these three treatment methods are doing and can do for Hematite, they are doing and can do on practically every economically important metallic and non-metallic mineral. No matter what the size range in which most ores can best be pre-concentrated and/or concentrated, Cyanamid can provide the process to achieve the highest possible recovery at the lowest practical cost.

Over the past three decades, Cyanamid Field Engineers and the Cyanamid Mineral Dressing Laboratory working with mill metallurgists the world over have accumulated a tremendous backlog of technical data and practical application experience on beneficiation methods. Over 50 million tons of raw feed will be concentrated by Heavy-Media Separation this year, while vast tonnages of urgently-needed base metals will be recovered with Cyanamid Reagents. With processes and reagents to treat any concentratable mineral in any size range, Cyanamid offers unprejudiced technical assistance in developing the most economic flow scheme plus on-the-job help in applying it to your mill feed.

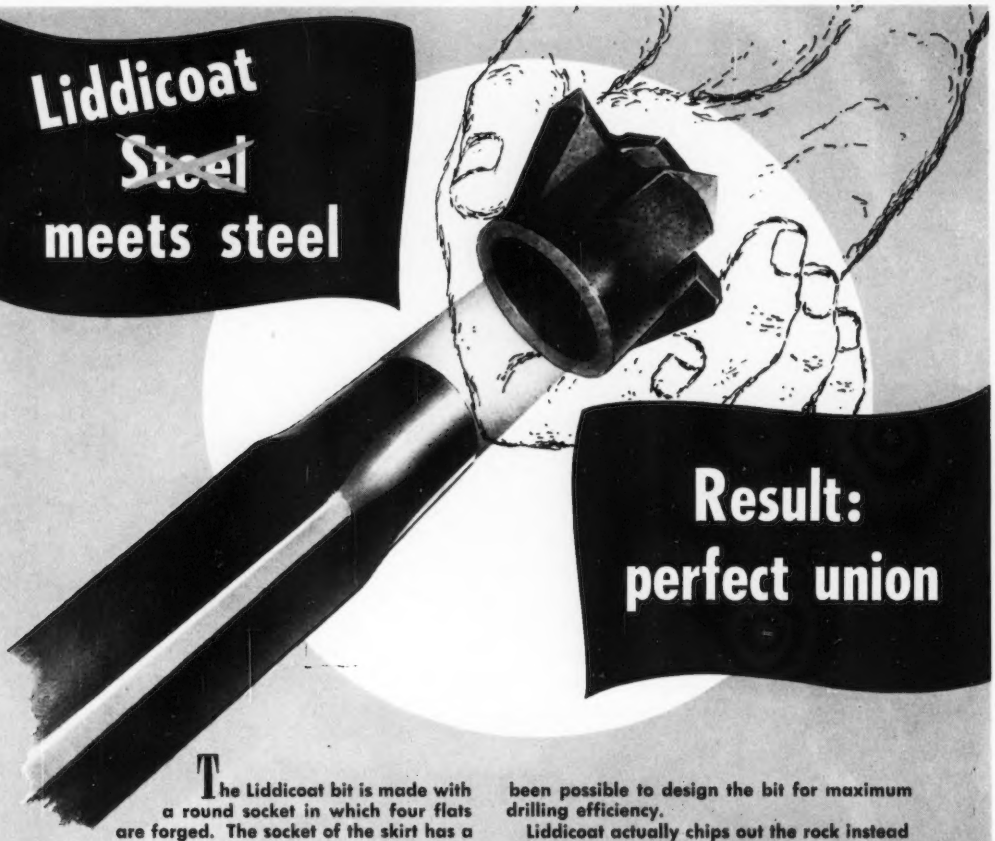
First step toward utilizing all the resources of Cyanamid Mineral Dressing Laboratory is a discussion of your objectives and problems with a Cyanamid Field Engineer. Your letter or telephone call will have his prompt and intelligent attention.

AMERICAN Cyanamid COMPANY

MINERAL DRESSING DIVISION

30 ROCKEFELLER PLAZA NEW YORK 20, NEW YORK

Liddicoat ~~Steel~~ meets steel



Result: perfect union

The Liddicoat bit is made with a round socket in which four flats are forged. The socket of the skirt has a slight taper but is malleable and conforms to the straight side of the rod. The bit fastens onto the rod with a drive fit as in contrast with the screw-on type of connection. Any turning of the rod within the bit socket tends to lock tightly the bit to the rod, yet it is easily removed with a weighted knockoff block.

The ease of attachment and detachment is only one of many reasons for the phenominal success Liddicoat has made in drilling operations in all type of ground.

FAST DRILLING — USED TO DESTRUCTION — NO RE-SHARPENING

Liddicoat provides fast cutting performance and long cutting life with a low initial cost per bit and lowest cost per foot of hole drilled. Since re-sharpening is not involved, it has been possible to design the bit for maximum drilling efficiency.

Liddicoat actually chips out the rock instead of battering it until it is pulverized, as is the case with conventional bits. This is the accomplishment of the two stage cutting action and the special wing design which retains sharp cutting portions for the life of the bit.

Test — and then you too will join the ever expanding list of satisfied Liddicoat customers representing many of the world's largest mining and contracting concerns.

PILOT CONSTRUCTION
Section "AA", along the high-centre wings.
Section "BB", along the low-centre wings.

WESTERN
Rock Bit Manufacturing Company
552 West 7th South • Salt Lake City 4, Utah

you can't beat progress...

These two 4-yd. electric shovels have played a big part in the successful change to open pit mining at Inspiration Consolidated Copper Mines at Inspiration, Arizona. A third P&H will provide increased production to meet the growing need for copper.

ELECTRIC P&H SHOVELS

All the advancements in electrical digging made by P&H have one common purpose — *lower tonnage costs.*

Here's *faster operation* with such P&H improvements as Magnetorque* Hoist Drive, stepless power regulation . . . independent propel for faster move-ups.

Here's *steadier digging* — many of the old mechanical devices which caused trouble and delay are eliminated — no slip friction clutches; no sliding gears to shift, no electrical contactors in main control system.

Here's *lower maintenance cost* — all-welded construction originated by P&H — induction-hardened gearing — filtered air cab.

When you put these, and other progressive P&H ideas to work, you're sure of lower tonnage costs in all kinds of open-pit operations.

P&H leads the field in electric shovel developments.

*T. M. of Harnischfeger Corporation for electro-magnetic type clutch.

P&H **ELECTRIC SHOVELS**
4454 W. National Avenue
Milwaukee 14, Wisconsin
HARNISCHFEGER CORPORATION

Every third P&H Electric Shovel sold is a repeat order

EXCAVATORS • OVERHEAD CRANES • HOISTS • ARC WELDERS AND ELECTRODES • SOIL STABILIZERS • CRAWLER AND TRUCK CRANES • DIESEL ENGINES • CANE LOADERS • PRE-ASSEMBLED H...

piping repairs *cost more* now!

Crane No. 351 125-Pound Iron Body Globe Valve

You make fewer of them by using Dependable Quality

CRANE VALVES

...That's why more Crane Valves are used than any other make

Preferred for true, tight seating

For smooth, positive regulation of flow, check Crane quality engineered Iron Body Globes with composition or metal disc. They're easy to operate; easy to maintain. Guide stem under disc assures square seating... true disc travel with minimum vibration. Seat rings are screwed in and can be renewed if necessary.

These rugged valves require little maintenance. Roomy stuffing box with bolted two-piece gland keeps tight stem seal, lengthens packing life. Stem threads are outside valve body, easy to lubricate.

Ask your Crane Representative to show you how Crane Quality valves and fittings not only give you more dependable piping performance... but cost less in the long run.

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VALVES • FITTINGS • PIPE • PLUMBING • HEATING

Reliable, Dependable, Performance

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This Mancha's Little Trammer is on the job—proving its staying power—in the South American Andes. It's a tough little locomotive (1½ tons) with a motor big enough for heavy, continuous work in high altitudes.

During the past quarter of a century, Mancha's Little Trammers have earned a reputation as hard workers in
- mines all over the world.

GET ALL THE FACTS ABOUT MANCHA LOCOMOTIVES— 1½ TONS TO 20 TONS. FILL IN THE COUPON AND MAIL IT TODAY!

Mancha Storage Battery Locomotive
Division GOODMAN Manufacturing Company
4850 South Halsted Street, Chicago 9, Ill., U.S.A.
E&MJ-1051

Tell me more about Mancha locomotives.

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FIRM _____

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MANCHA STORAGE BATTERY LOCOMOTIVE
Division GOODMAN *Manufacturing Company*
4850 SOUTH HALSTED STREET CHICAGO 9, ILL., U. S. A.

They did...

Kennecott saw the advantages of maximum production and lower costs through modern electrical equipment.

what...

They had Westinghouse help develop *co-ordinated electrical systems*—based on our previous experience with similar installations.

you can do...

Do what hundreds of other mining firms are doing. Have Westinghouse work with your engineers and consultants in applying modern equipment in your electrical operations.

to produce more

Whether it's a complex electrical system, better servicing, or simply a piece of electrical equipment to do a tough job, Westinghouse has the answer.

Two Modern Production Techniques at Kennecott's new refinery

Here are two interesting production ideas in operation at the new Kennecott Copper refinery at Garfield, Utah—(1) the large Lectromelt arc furnaces used for melting and (2) the method of supplying d-c power for cranes and auxiliaries.

Furnace output 2 or 3 times that of reverberatory types

Three large Westinghouse-equipped Lectromelt furnaces melt the electrolytic copper. Each furnace is a continuous melting unit and produces at a high rate. Accurate control and absence of combustion produce a high-quality product. There's no possibility of fuel contamination and no need for poling.

Westinghouse makes all furnace equipment

All electrical equipment for use with the furnaces was supplied by Westinghouse. Furnace transformers have the Westinghouse shell-form construction, inherently much stronger and better-cooled than core-type design. The Westinghouse air circuit-breakers operate about 15,000 times between inspections—as against 2,000 times for conventional furnace breakers. Furnace control is Westinghouse ROTOTROL® which responds fast and accurately maintains proper melting conditions.

D-C power supplied at low cost

Another major item of equipment at Kennecott is the Westinghouse Ignitron substations which turn out d-c power for cranes. These rectifiers have no major moving parts and need very little maintenance or attention. In two years of service there have been no tube failures. The units average about 6% higher efficiency than corresponding motor-generator sets and they cost considerably less to buy and install.

Call Westinghouse for ALL mining apparatus

The results at Kennecott are typical of the performance of *all* Westinghouse equipment for mining. When your next job comes up, get in touch early with your nearby Westinghouse office. Westinghouse Electric Corporation, Box 868, Pittsburgh 30, Pa.

J-94880

YOU CAN BE SURE... IF IT'S

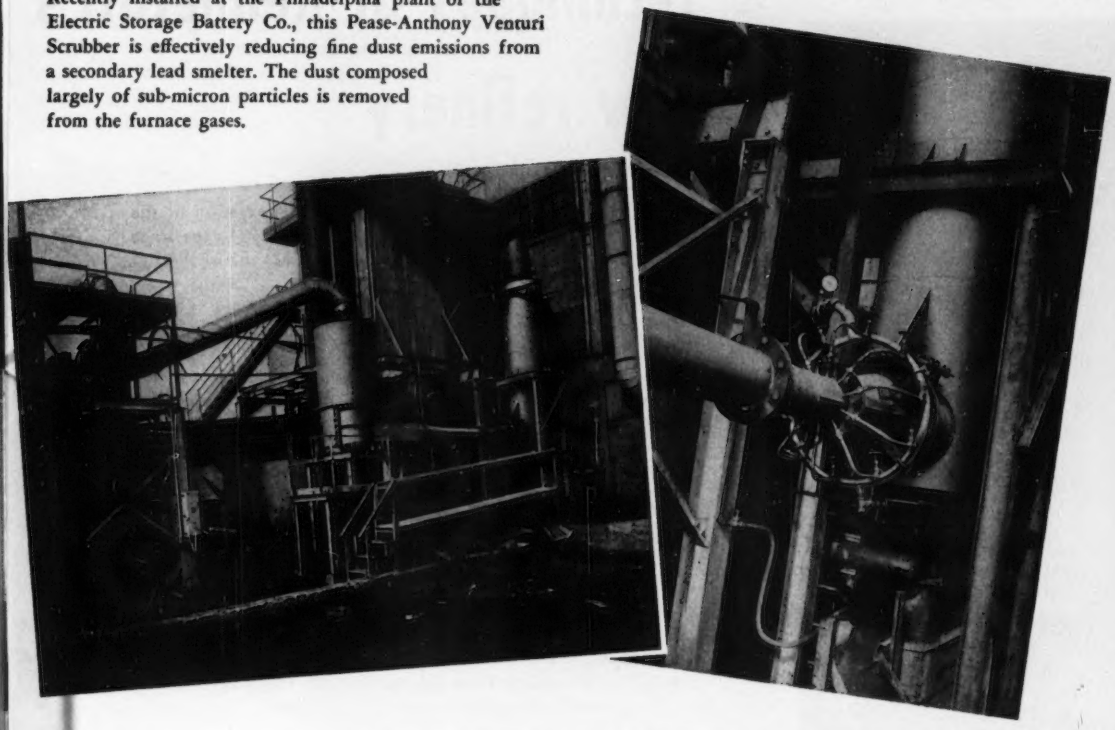
Westinghouse

WESTINGHOUSE

EQUIPMENT FOR THE MINING INDUSTRY

Here's Efficient DUST and FUME Removal

Recently installed at the Philadelphia plant of the Electric Storage Battery Co., this Pease-Anthony Venturi Scrubber is effectively reducing fine dust emissions from a secondary lead smelter. The dust composed largely of sub-micron particles is removed from the furnace gases.



Other Typical Applications

Chemico P-A Venturi Scrubbers are now being used in a wide range of industries for the highly efficient removal of micron and sub-micron dusts and fumes. For a detailed analysis of your scrubbing problem, write or call our P-A Sales Department.

APPLICATION	MATERIALS BEING REMOVED	DUST AND FUME LOADINGS Inlet to Scrubber	Outlet from Scrubber
DUSTS			
Diatomaceous Earth Plant	Diatomaceous Earth	1.2 grains/scf	0.05 grains/scf
Rubber Blenders	Carbon Black	0.3 grains/scf	0.003 grains/scf
Yellow Brass Foundry Furnace	Zinc Oxide	3.5-10 grains/scf	0.7 grains/scf
Lime Kilns	Lime and Na_2O Fumes	7.0 grains/scf	0.02 grains/scf
Electric Furnace Fumes	Iron Oxide	0.2 grains/scf	0.03 grains/scf
Blast Furnace	Iron Oxide	4.0-20.0 grains/scf	0.008-0.08 grains/scf
Secondary Lead Blast Furnace	Lead and Rubber Compounds	1-10 grains/scf	0.05-0.20 grains/scf
FUMES			
Copperas Roasting Plant	H_2SO_4 Mist	100-300 Mg/scf	1-5 Mg/scf
Titanium Plant	H_2SO_4 Mist	120 Mg/scf	2.0 Mg/scf
Phosphoric Acid Plant	H_3PO_4 Mist	100-300 Mg/scf	3.0 Mg/scf
Wood Distillation	Tar Fog and Acetic Acid Mist	1000 Mg/scf	10-40 Mg/scf
Enamel Smelting Furnace	Dust and Fluoride Fumes	55.0 Mg/scf	4.0 Mg/scf
Dry Ice Plant	Amine Fog	25.0 Mg/scf	5.0 Mg/scf

CHEMICAL CONSTRUCTION CORPORATION

A UNIT OF AMERICAN CYANAMID COMPANY

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CABLES: CHEMICONST, NEW YORK

EUROPEAN TECHNICAL REPRESENTATIVE

CYANAMID PRODUCTS, LTD., NORTH WEST WING, BUSH HOUSE

ALDWYCH, LONDON W.C. 2, ENGLAND

CC 884

Chemico plants are profitable investments

TL-1530 Trailer with EUCLID

TRB-15D Trailer with GMC

TP-1114 Trailer with FORD

BD-1118H Body with AUTOCAR

ALL THREE new cement plants chose EASTON SIDE-DUMPS

BP-1114 Body with STERLING

illustration below shows a double-bottomed EASTON TD-1222H Drop Door Side-Dump Trailer with MACK LR, capacity 45 tons. Investigate these, and other EASTON Side-Dump Trailers and Truck Bodies.

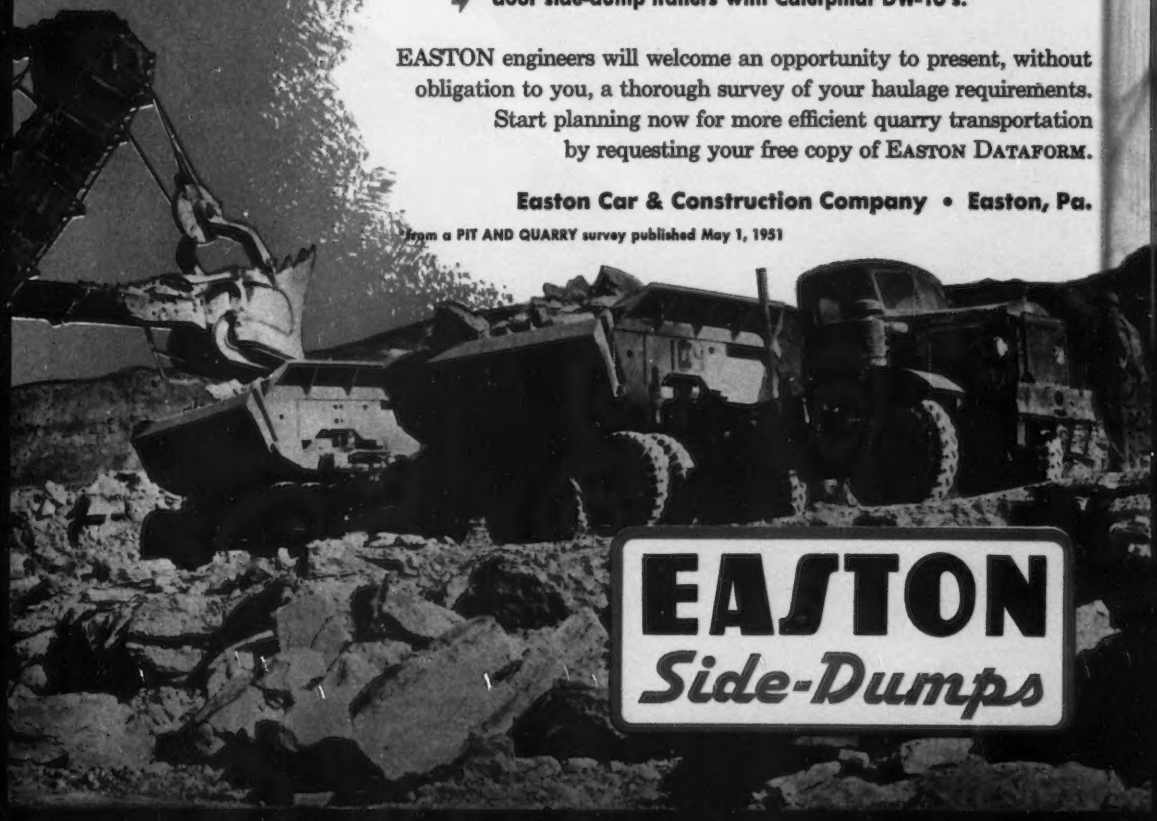
All three of the new cement plants which will operate quarries in the United States (classified as under construction or definitely planned for 1951)*, have chosen EASTON Side-Dumps for quarry haulage.

- **Two of the new plants will use EASTON Model TP-1114 pan type side-dump trailers with Mack LFT's.**
- **One of the new plants will use EASTON Model TL-1015 lift door side-dump trailers with Caterpillar DW-10's.**

EASTON engineers will welcome an opportunity to present, without obligation to you, a thorough survey of your haulage requirements. Start planning now for more efficient quarry transportation by requesting your free copy of EASTON DATAFORM.

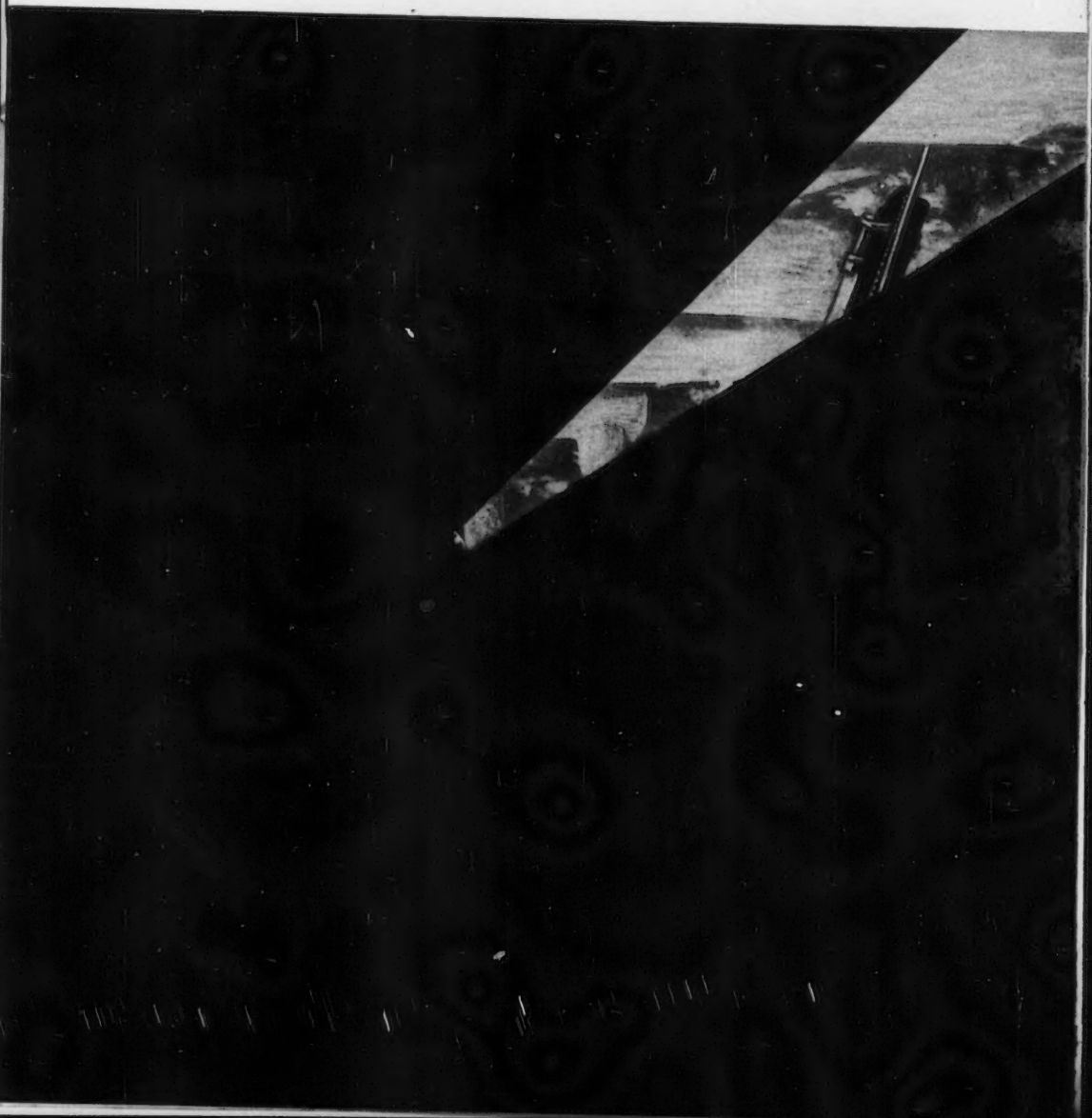
Easton Car & Construction Company • Easton, Pa.

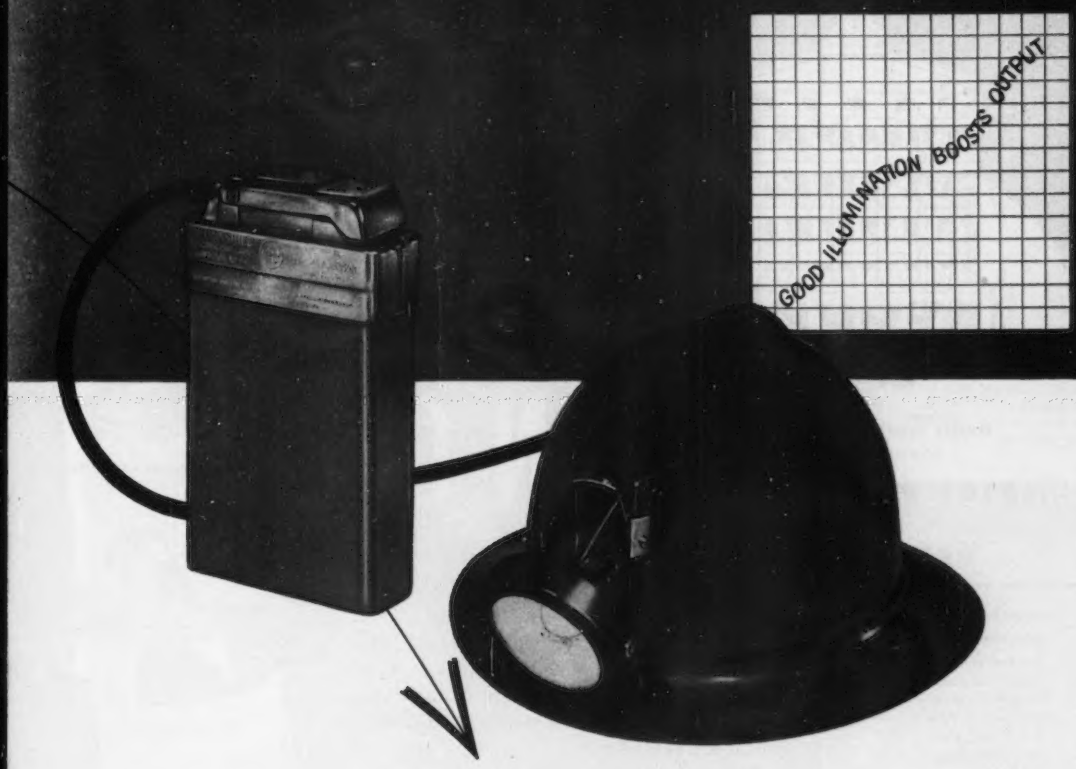
*From a PIT AND QUARRY survey published May 1, 1951



EASTON
Side-Dumps

Extra ILLUMINATION for MECHANIZATION





WITH THE M.S.A.

EDISON MODEL R-4 ELECTRIC CAP LAMP

Every step forward in mechanized mining calls for something extra in illumination. Keeping ahead of this ever-increasing need for effective lighting is essential to the miner's safety and the mine's production. You'll find a dependable and profitable solution in the Edison R-4 Lamp. Its brilliant, unfailing light is designed to fill your lighting needs today, with an extra margin of performance to meet any expanded requirements of tomorrow. Providing *more* and *better* light, the R-4 keeps the men in step with advancing mechanization.

This vital mining tool pays off in greater safety and higher production too. Its brilliant beam illuminates every detail of the job, exposes lurking hazards, encourages greater tonnage output. Its design and construction keeps it on the job, shift-after-shift, month-after-month, for years.

And you'll find the R-4 gives an extra bonus in service requirements—it requires less handling, fewer man-hours to maintain, and is quick and simple to service.

Write for Bulletin No. M-19 for complete details, or let us arrange an actual demonstration in your particular mining operation at your convenience.

MINE SAFETY APPLIANCES COMPANY

Braddock, Thomas and Meade Sts., Pittsburgh 8, Pa.

At Your Service: 48 BRANCH OFFICES in the UNITED STATES

MINE SAFETY APPLIANCES CO. OF CANADA LIMITED
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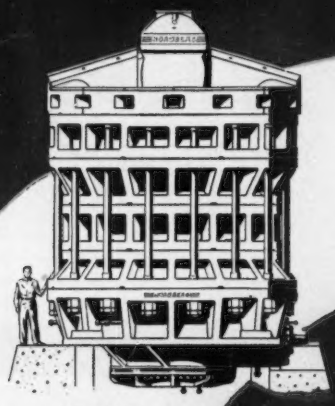
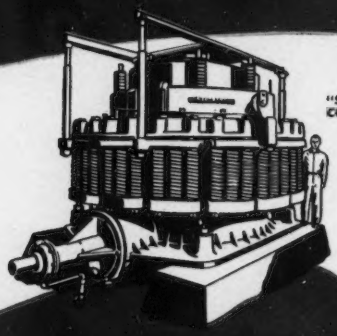
CABLE ADDRESS: "MINSAF" PITTSBURGH

M.S.A.
SAFETY EQUIPMENT HEADQUARTERS

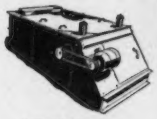
When you have a safety problem, M.S.A. is at your service. Our job is to help you.



"SYMONS" PRIMARY CRUSHERS



"SYMONS" CONE CRUSHERS



"SYMONS" VIBRATING SCREENS

"SYMONS" VIBRATING BAR GRIZZLIES

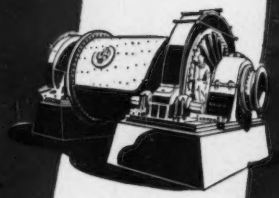
IRON ORE

MAJOR PRODUCERS OF

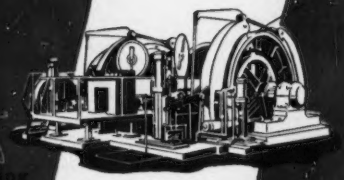
RELY ON NORDBERG MACHINERY

Partial list of Nordberg Machinery users among iron ore producers:

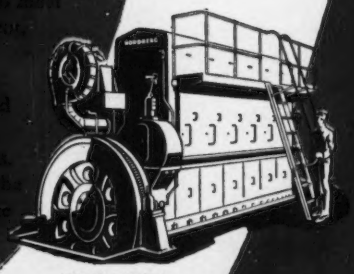
Alan Wood Mining Company
Appleby Frodingham Steel Co., Ltd.
Balkan Mining Company
Bethlehem Steel Company
S. K. F. Hofors Bruk
Brazilian Steel Corp.
Butler Brothers
Cleveland Cliffs Iron Company
Colorado Fuel & Iron Corporation
Columbia Iron & Steel Corp.
Consett Iron Co., Ltd.
Dominion Steel & Coal Corp.
Grangesbergs Gem Forvaltning
M. A. Hanna Co.
Holman Cliffs Iron Mining Co.
Sandvikens Jernverk
Jones & Laughlin Steel Corp.
Kaiser Company, Inc.
Kershaw Mining Company
Lone Star Steel Company
Luossavaara-Kiirunavaara
Mesabi Cliffs Iron Mining Co.
Michipicoten Iron Mines, Ltd.
National Lead Company
Oliver Iron Mining Company
Ozark Ore Company
Pickands Mather & Company
Republic Steel Corporation
Scatia Mining Company
Stoss-Sheffield Steel & Iron Co.
A/S Sydvaranger
T.C.I. & R.R. Co.
Tata Iron & Steel Co.
A/S Titania
Warren Foundry & Pipe Corp.
Wisconsin Steel Mines
Witkowitzer-Bergbau-u-Esenhutengew
Woodward Iron Company



GRINDING MILLS



MINE HOISTS



DIESEL ENGINES

M451

NORDBERG MFG. CO.
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NEW YORK • SAN FRANCISCO • WASHINGTON • SPOKANE
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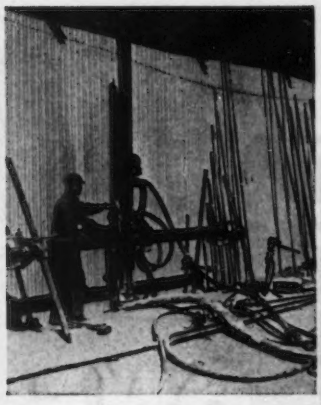
NORDBERG MACHINERY

The Rock of Ages quarry at Barre now has a depth equal to the height of a 27-story building. The area of the opening is about 40 acres. Largest source in the world for monumental granite, this famous operation was visited by 17,000 sightseers in 1950.

This quarry-bar mounting holds the rock drill on a movable saddle, permitting closely-spaced holes to be drilled in perfect alignment. Rods of Bethlehem Hollow Drill Steel at the right are fitted with detachable bits.



ROCK OF AGES from the rugged hills of Vermont

For more than a half century Rock of Ages granite has been a symbol of unyielding strength and everlasting beauty—a rock whose fine-grained texture is worthy of the highest skills in sculpture, architecture, and memorial carving.

Granite at its finest is found in the Rock of Ages quarry near Barre, Vermont. It occurs not in strata, but in the form of huge boulders — a geological formation that releases its treasure with great reluctance.

A dense, igneous material, Rock of Ages granite is a compact mixture of feldspar, biotite and quartz—the hardest of the constituents. Blasting is seldom used in quarrying because the beauty and texture of the premium granite would be marred.

Usually a line of closely-spaced holes is drilled in one direction; others are drilled at right angles to the first. Wedges are then driven into the holes to break the block loose. It all sounds very simple. But it sometimes requires as long as two months of patient drilling for two men to channel and break out a block 30 ft long, 30 ft wide and 15 ft high, weighing about 135 tons. And 80 per cent of all material hoisted from the quarry is unusable for memorial purposes.

The drilling of this hard, dense-grained rock calls for special equipment and good steel. Every bar of hollow drill steel used at this Rock of Ages quarry is exclusively Bethlehem. This fine steel gives dependable, economical service.

BETHLEHEM STEEL COMPANY
BETHLEHEM, PA.

On the Pacific Coast Bethlehem products are sold by Bethlehem Pacific Coast Steel Corporation
Export Distributor: Bethlehem Steel Export Corporation

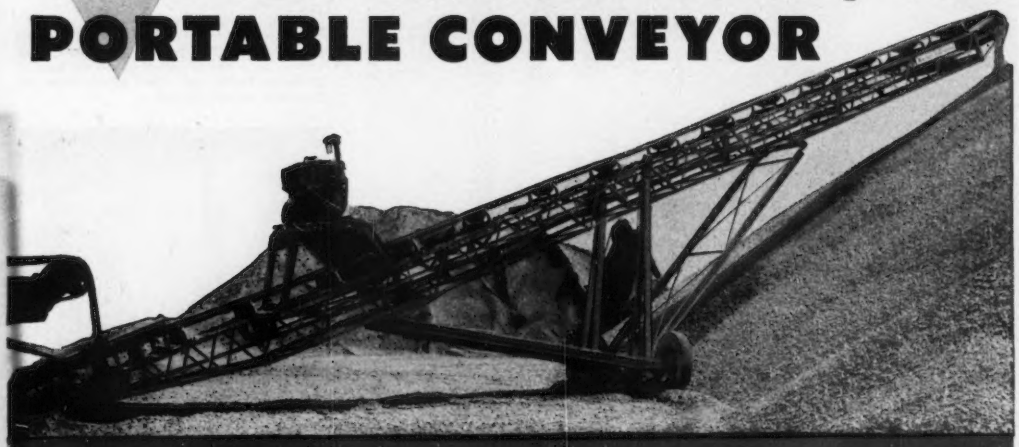
★ BETHLEHEM STEEL ★

BETHLEHEM HOLLOW DRILL STEEL

Barber-Greene

MODEL 374

HEAVY-DUTY LONG-REACH 150 TO 425 TONS/HR. PORTABLE CONVEYOR



ONE MAN high-capacity loading, unloading, stockpiling of all bulk materials

197-A

Barber-Greene Company

Aurora, Illinois

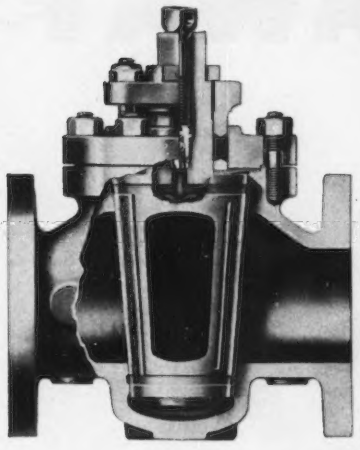
WALWORTH

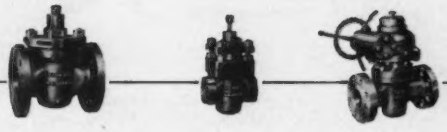
Lubricated

Plug Valves

for TOUGH assignments

where tight shut-off...
and easy operation
are "MUSTS"





Walworth Lubricated Plug Valves Offer These Advantages

- Complete surrounding of ports with resistant lubricant affords positive seal against leakage.
- Lubricant grooving system assures ease of operation — tight shut-off — greater protection against corrosion.
- Body and plug fully protected by lubricant from attack by line fluids.
- Quarter turn opens or closes valve.
- Made in a complete range of sizes ½" to 26" and for pressures from 175 to 5,000 psi., and for vacuum requirements.

For handling petroleum products, natural or manufactured gas, acids, alkalies, solvents, slimes, slurries . . . in fact for almost any hard-to-handle liquids—there's a Walworth Lubricated Plug Valve designed for the job.

Easy to operate, tight sealing, resistant to wear and corrosion, Walworth Lubricated Plug Valves assure long years of dependable service at low operating cost.

Walworth Lubricated Plug Valves are available in sizes ½" to 26" for pressures from 175 to 5,000 psi., and for vacuum requirements. For full details—prices, sizes, dimensions, and other pertinent data, see your Walworth distributor or write to:

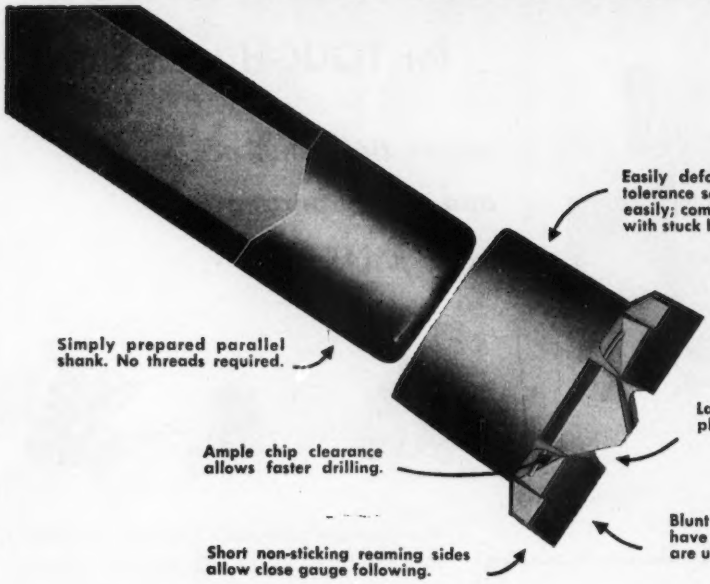
WALWORTH

valves • fittings • pipe wrenches

60 EAST 42nd STREET, NEW YORK 17, N. Y.

DISTRIBUTORS IN PRINCIPAL CENTERS THROUGHOUT THE WORLD

THROWAWAY


Easily deformable skirt with close tolerance socket hole . . . bit goes on easily; comes off easily; no lost time with stuck bits.
Simply prepared parallel shank. No threads required.
Large hemispherical non-plugging water outlet.
Ample chip clearance allows faster drilling.
Blunt non-breaking cutting edges have self-sharpening tendency — are uniformly hard.
Short non-sticking reaming sides allow close gauge following.

LOWER YOUR DRILLING COSTS

with

SMALLER HOLES AND FASTER DRILLING

Bottom with 1¼" Hole
Save Powder and Steel

WRITE FOR NEW LOW PRICE LIST

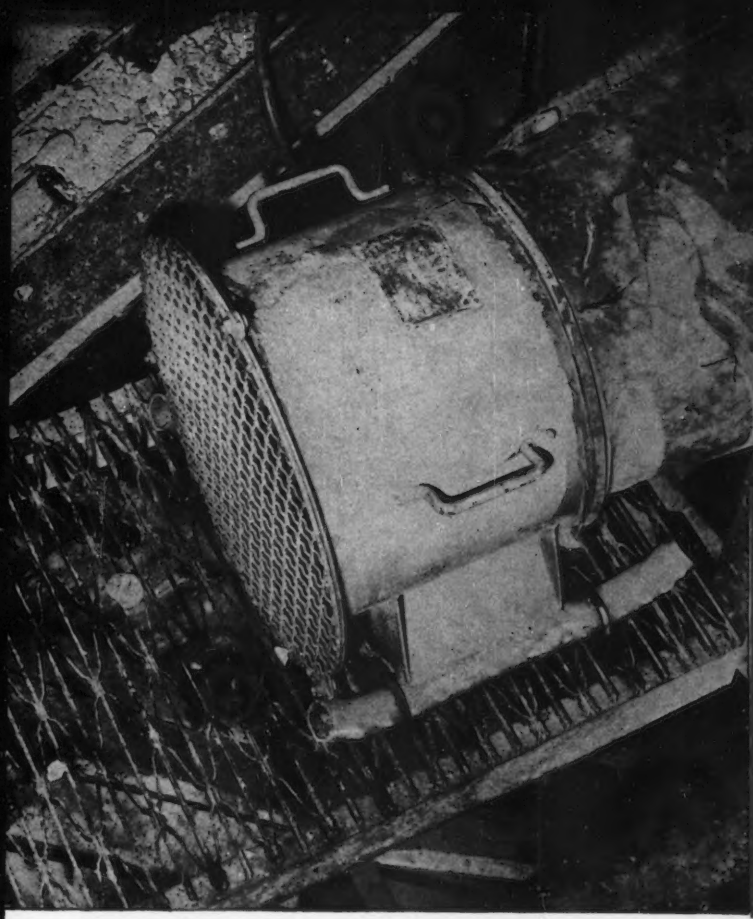
THE "TEST" WILL PROVE ITS WORTH

THROWAWAY BIT CORPORATION

4200 N.W. Yeon Ave. **Portland, Oregon, U.S.A.**

Fully descriptive literature on all products is available. Competent field engineers and dealers are always at your service.

Some territories still open for distributors and jobbers.



Left: a JOY Type I-16 Portable Mine Blower in service. Right, an I-21, member of the broad JOY line.
Right: a JOY Series 1000 Axivane Adjustable Blade Fan, for intermediate ventilating needs up to 100,000 cfm.

SAVE VENTILATING COSTS

with these all-purpose, two-in-one units

JOY AXIVANE Portable Blowers are setting new records for low-cost ventilation wherever they're installed. Right at the start, their vaneaxial design principle is more compact and efficient, consuming less power for the required volume of air. And even more important, the high efficiency of JOY vaneaxial-type blowers is maintained over a much broader range of pressure than other designs. That means you can operate JOY Blowers economically in either low or high-pressure service—they're equally adaptable for use with short or long runs of tubing. For example, when you want to supply air to a deeper or more remote section of the mine, you no longer need a different type of blower for the new service—JOY AXIVANE Blowers can do the whole job. ● *Call on us for specifications and performance data—ask for Bulletin J-607.*

Consult a Joy Engineer

W & D M3411

JOY

AXIVANE

PORTABLE

BLOWERS

*Reg. U.S. Pat. Off.

JOY MANUFACTURING COMPANY

GENERAL OFFICES: HENRY W. OLIVER BUILDING · PITTSBURGH 22, PA.

IN CANADA: JOY MANUFACTURING COMPANY (CANADA) LIMITED, GALT, ONTARIO

NEW SEPARATOR Cuts Tailings Losses

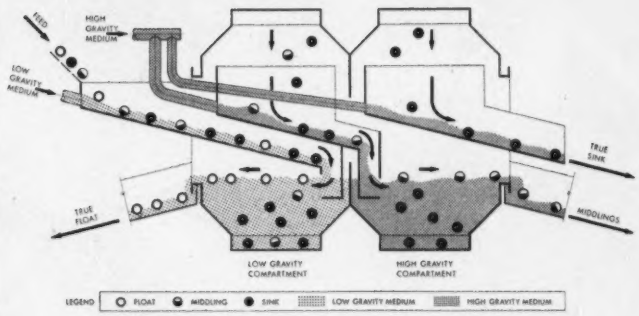
Improved two-stage separation equipment brings new standards of control to Heavy-Media Separation.

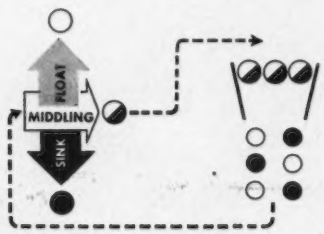
Substantial reductions in tailings losses with significant upgrading of the valuable product are gained by accurate gravity control in the new WEMCO Two-Compartment Drum Separator. Incorporated in the WEMCO Mobil-Mill, the improved separator represents an important advance in Heavy-Media Separation techniques.

Three distinct materials are produced by the WEMCO unit: (1) a true float product, (2) a true sink material, and (3) a middling which may be re-crushed and recycled to the separator for recovery of the valuable fraction.

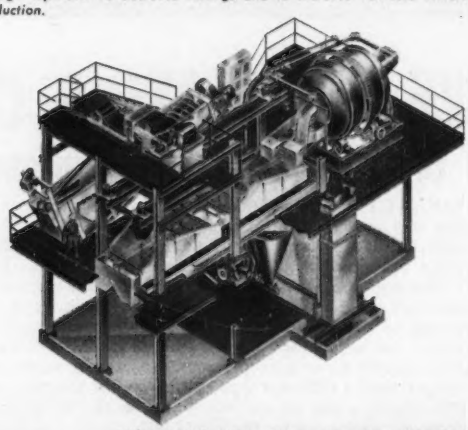
Since only the middling is re-crushed, increased capacity without costly duplication of equipment or increased floor space results. Investment and operating costs are lower per ton of valuable product and media losses are kept to a minimum by the efficient design of this new WEMCO Two-Compartment Separator.

Inquiries for further information should be directed to the manufacturer.





Illustrating ***WEMCO'S*** *method of producing 3 products in a single separatory vessel by accurate control of heavy medium. Middling is re-cycled through separator to decrease tailings and to increase valuable mineral production.*



WEMCO *Mobil-Mill with new type Drum Separator.*

OTHER WEMCO PRODUCTS

Mobil-Mills • Coal Spirals • HMS Thickeners
HMS Pumps • Densifiers • Cone Separators
Drum Separators • Fagergren & Steffensen Flotation Machines • Fagergren Laboratory Units
Hydroseparators • HMS Laboratory Units
Dewatering Spirals • Agitators • S-H Classifiers
Thickeners • Sand Pumps • Conditioners

WEMCO
WESTERN MACHINERY COMPANY
760 766 FOLSOM STREET SAN FRANCISCO 7, CALIFORNIA

B.F.Goodrich

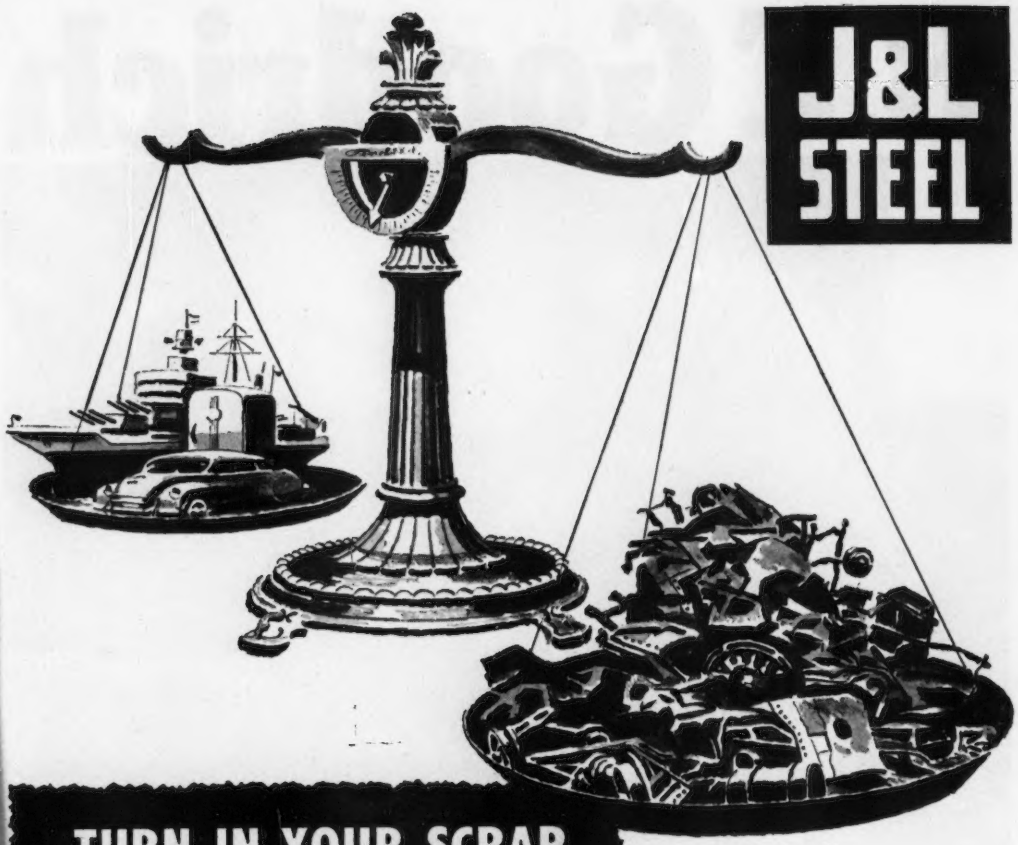
Universal tread gives 2-way traction over any hauling surface

THESE husky B. F. Goodrich Universal tires are made to order for tough mining operations. No matter what the hauling surfaces may be—crushed rock and broken limestone or slushy mud and water—the scientific tread design assures positive traction both forward and in reverse. They can be mounted in *any* position.

Built to give a lifetime of trouble-free service, these mining tires have the added protection of the *nylon shock shield*. Extra strong, elastic nylon cords are built in between the tread rubber and the cord body. Under the sudden impacts and shocks of mining operations, these cords work together—absorbing and distributing the shock evenly. This patented B. F. Goodrich feature is found on all BFG truck tires of 8 or more plies. And remember, *only* B. F. Goodrich has this safety feature which results in additional savings through (1) longer tire life (2) more recappable tires (3) greater bruise resistance and (4) less danger of tread separation.

Other BFG tires are available to meet the needs of *all* types of mining operations—both deep mine and stripping. You'll want to learn more about these tires that give better service, longer life and lower operating overhead. For complete information, see your local BFG dealer or write direct. *The B. F. Goodrich Company, Akron, Ohio.*

RESEARCH KEEPS
B.F.Goodrich
FIRST IN RUBBER



J&L STEEL

TURN IN YOUR SCRAP — HELP BALANCE STEEL PRODUCTION!

You have some of the Mesabi Range cluttering up YOUR plant!

The iron and steel scrap in *your* operation—old machinery, parts, fixtures, etc.,—is worth twice its weight in precious Mesabi iron ore. Today this scrap is a vital natural resource. *Maximum steel production is impossible without it.* Every pound of scrap you can salvage is needed to help meet today's record demand for the steel to build a strong defense and to meet civilian needs.

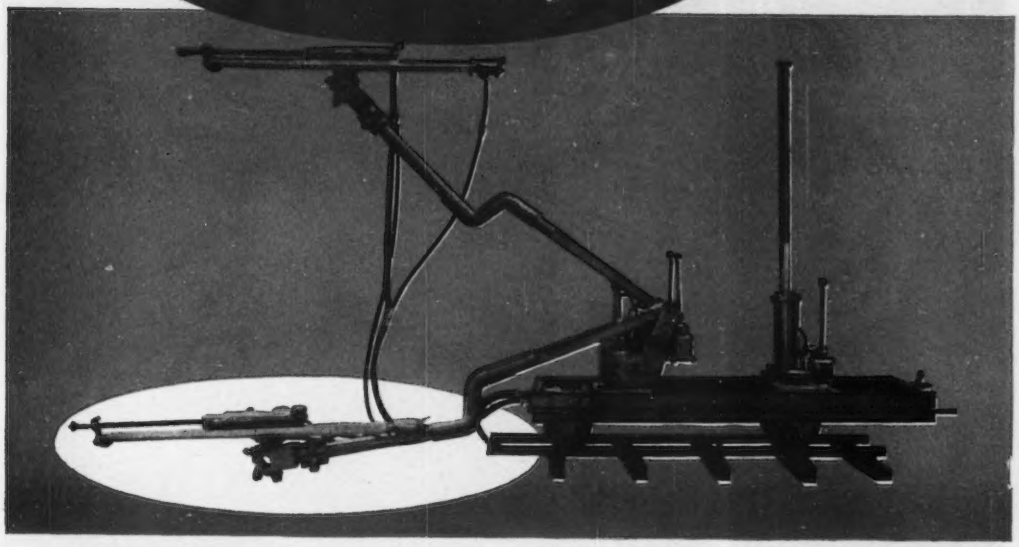
COMB YOUR OPERATION FOR STEEL SCRAP NOW!

No matter what business you're in, you probably have more scrap than you realize. Appoint a responsible man to round it up. Set a date to have the job done. Your local scrap dealer will pay you for the scrap you collect. He'll speed it back into production. Act now. The need is urgent.

JONES & LAUGHLIN STEEL CORPORATION
PITTSBURGH 30, PA.

GIVE YOUR LIFTERS A LIFT!

Complete truck-mounted units include hydraulic roof jack and either one, two or three drill booms.



Hydraulic boom and roof jack units are available separately for mounting on your own custom-built jumbo.

These offset booms are great time-savers when you're drilling the lifters. Your runner doesn't have to take time out to swing the drill under — steel is easily and quickly centered on *every* hole in the face.

And that's only one of the *many* big advantages of Gardner-Denver Hydraulic Drill Jumbos. Other features include:

- **Faster set-up—move in and start drilling.**
- **Faster tearing down—release hydraulic pressure and the jumbo's off to another heading.**
- **"Creep-free" booms—hold steel steady and true.**
- **Hydraulic roof jacks—hold truck on-the-spot.**
- **Handle long feeds—up to 10-foot steel changes—for efficient use of tungsten carbide bits.**

Write today for complete information.

SINCE 1859

GARDNER-DENVER

THE QUALITY LEADER IN PUMPS, COMPRESSORS AND ROCK DRILLS

Gardner-Denver Company, Quincy, Illinois

In Canada: Gardner-Denver Company (Canada), Ltd., Toronto, Ontario

the ideal drill

FOR EXPLORATORY DRILLING

Core drilling at a large western property.

With its high capacity—500 feet with E Rods and EX Fittings—its self-aligning rod puller for holes deeper than 100 feet . . . and a delicacy of bit control that gives low bit cost and high core recovery . . . the CP-55 Diamond Drill is unequaled for locating new ore bodies or extensions of existing ones.

Designed around the CP Rotary Air Motor—the fastest, most powerful rotary motor on a diamond drill, the CP-55 is recognized for its high drilling speed, light weight and low maintenance. It is equally efficient for blast hole drilling.

For the larger holes, or difficult drilling conditions requiring high torque with relatively slow spindle speed, the CP-55A is recommended.

Write for Bulletin 318-2

CHICAGO PNEUMATIC TOOL COMPANY

General Offices: 8 East 44th Street, New York 17, N. Y.

PNEUMATIC TOOLS • AIR COMPRESSORS • ELECTRIC TOOLS • DIESEL ENGINES
ROCK DRILLS • HYDRAULIC TOOLS • VACUUM PUMPS • AVIATION ACCESSORIES

70% Deeper Traction Tread!

For the first time highway performance matches off-the-road efficiency! *The proof is in!* Fleet operators acclaim U. S. Royals as the first to completely fulfill the tough on-and-off-the-road operating demands. That's because tread and carcass are *job-fitted* to give new *penetration* and *traction off the road* plus—*smooth, long-wearing, non-skid mileage on the highway.*

Here's what the Fleetmaster gives you:

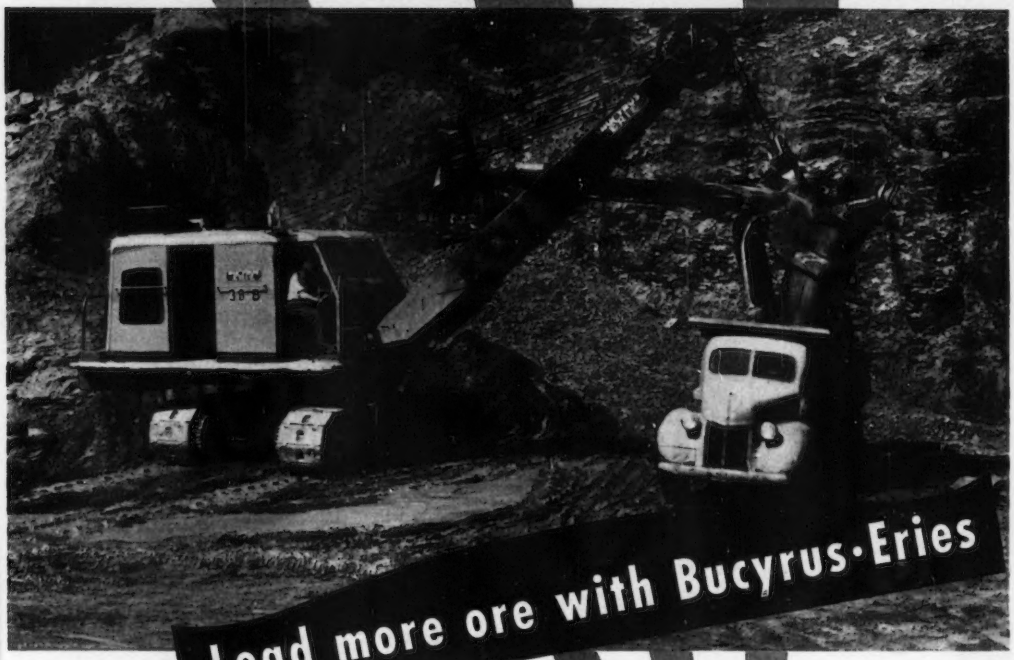
- ★ *70% deeper traction tread!*
- ★ *Tougher, stronger carcass! (More Recaps)*
- ★ *Specialized tread compounds!*
- ★ *Thicker under-tread!*
- ★ *Round-molded to the tire's inflated shape to reduce distortion stress and strain!*

Your proof is at your U. S. Royal Dealer's. A phone call gets it for you—he's listed in the Classified Telephone Book.

UNITED STATES RUBBER COMPANY

Digging • Swinging • Dumping

speed *speed* *speed*



Load more ore with Bucyrus-Eries

For more than five decades the fastest, most efficient ore-loaders in the mining world have been Bucyrus-Eries—acknowledged leaders in their field. That's because their high output features help get the ore out in a hurry—features like smoothly balanced machine speeds and power, coordinated by direct-connected mechanical controls; anti-friction bearings liberally used to assure smooth, steady power flow; and easy-filling dippers to scoop up full loads of ore on each pass, dumping quick and clean with wet or dry material. True simplicity of design and large, strong parts easily accessible for maintenance keep your output high, downtime low —especially important when operating far from repair facilities.

See how a Bucyrus-Erie can help boost your output records—contact your Bucyrus-Erie distributor for the full facts.

303E51

BUCYRUS ERIE

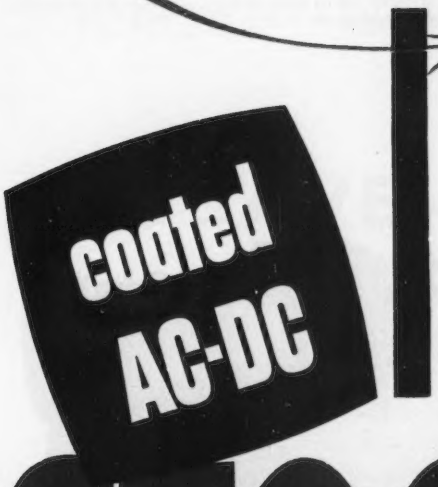
South Milwaukee, Wisconsin

Most *Most*

COMPARED • PREFERRED

3/8 to 4-yd. diesel, gasoline and single motor electric excavators.

longer life for CRUSHERS!



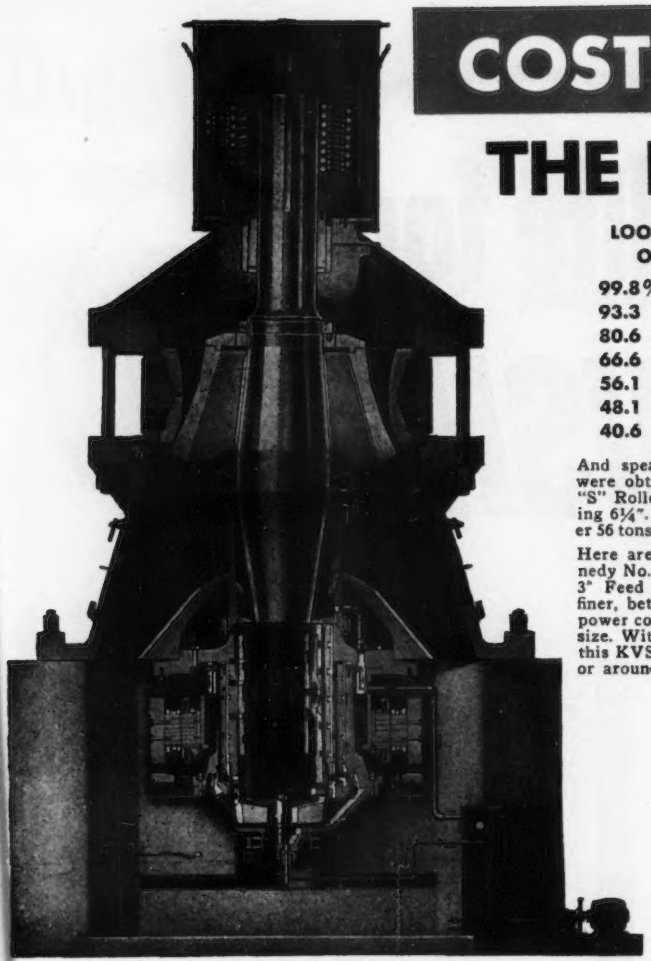
Less down-time . . . less welding time . . . more production . . . more uniform aggregates—at lower cost! Coated AC-DC STOODITE gives you all that!

Compare total crusher maintenance cost, not just the first cost of the electrode you use. AC-DC STOODITE costs more than many rods, *BUT it's cheap in view of the tonnage produced.* Your welder will like the smooth arc, the speed and the ease with which he can lay STOODITE down.

Test AC-DC STOODITE . . . apply it on new crushers—or follow the wear pattern on worn rolls and cones. There are 600 Stoody dealers in the United States and Canada ready to serve you.

STOODY COMPANY
11940 E. SLAUSON AVE., WHITTIER, CALIF.

STOODITE



COST DOWN THE KVS WAY

LOOK AT THESE GRADATION FIGURES ON CLOSED CIRCUIT OPERATION

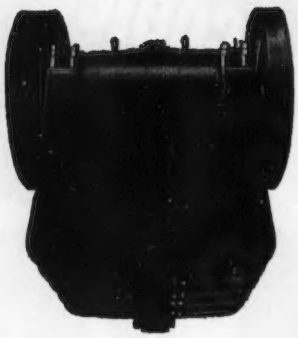
99.8%	Minus	3	MESH
93.3	"	4	"
80.6	"	6	"
66.6	"	8	"
56.1	"	10	"
48.1	"	14	"
40.6	"	20	"

And speaking of cost cutting—the above results were obtained from four No. 37½ Kennedy Type "S" Roller Bearing Gyratory Crushers. Feed opening 6¼". Discharge 7/32". Capacity of each crusher 56 tons per hour; power requirements 48 h.p. each.

Here are the results of another test run! A Kennedy No. 37½ Crusher with a Special Grinding Ring 3" Feed Opening gave 50% more product (and a finer, better product at that) for about HALF the power cost of a competitive crusher of a comparable size. With power costing say 1 cent per h.p. hour, this KVS saved some 40 h.p. (or about $11.00 daily) or around $3,000 a year. Think THAT over!

THE KVS WAY

We cut power costs in the "KVS" Swing Jaw Crusher. The STATIONARY jaw now carries 50% of the crushing load, instead of leaving it all to the SWING jaw. Another thing we cut way down is PARTS TROUBLE. The swing jaw is ALL IN ONE PIECE, except for the jaw plate. And that is removable. Note also—Swing and Stationary jaws are INTERCHANGEABLE, and reversible end for end. This means DOUBLE jaw-crushing life.

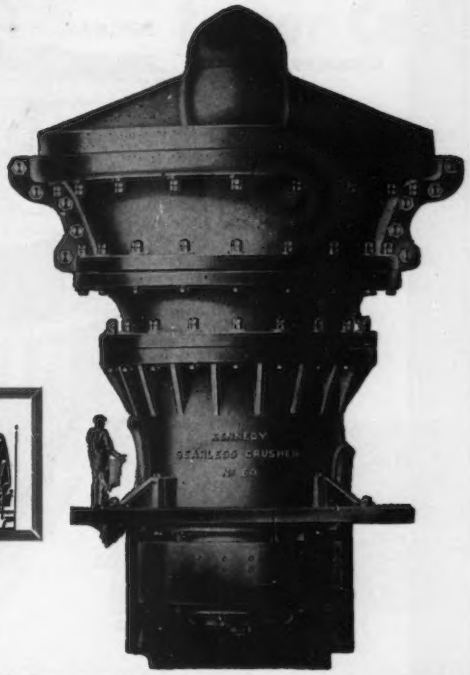


LESS COST MORE PRODUCTION WHEN

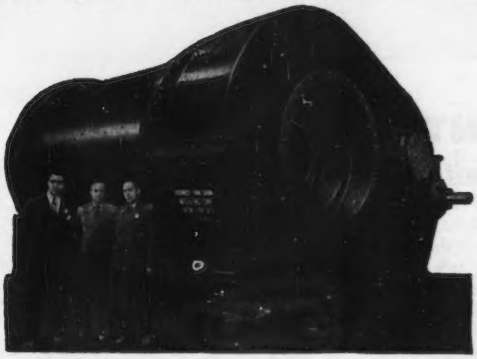
— PRODUCTION UP !!!

THE KVS WAY

In the "good old days," the big whirling flywheel or pulley of an old Corliss Engine produced extra KINETIC ENERGY! In other words, added FREE power! TODAY the BIG Revolving Pulley in the "KVS" Gearless does the same thing. It revolves at 3,500 ft. per minute—creates EXTRA crushing power for more production—without extra added cost. The 11 ton pulley (used in a "KVS" Gearless Crusher weighing 400,000 lbs.) turns so easily you can turn it on its roller bearings with TWO FINGERS! In simple words —more CRUSHING with LESS POWER, less vibration and less NOISE, too, has put the "KVS" Gearless way out in front when it comes to costs DOWN and production UP—and performance proves it



AND SAVE—THE KVS WAY!



Thinking of buying a 10' diameter ball mill? If so, you can save up to $5,000 by buying a "KVS" Mill with INTEGRAL GEAR drive and using a SYNCHRONOUS MOTOR DIRECT CONNECTED to driving shaft. Pinion shaft runs about 600 r.p.m. Pinion shafts in other mills run at about 180 r.p.m. "KVS" trunnions on large sized tube and ball mills CARRIED ON OIL. Bearing never wears out, uses little power. All gears and bearings automatically oil sprayed before mill is started (design pat'd). In 15 years on this type mill no "KVS" gears or pinions have worn out.

WRITE today for complete set of "KVS" Bulletins if you want MORE production with LESS cost.

Kennedy-Van Saun
MANUFACTURING AND ENGINEERING CORPORATION
2 PARK AVE., NEW YORK 16, N. Y.
FACTORIES:
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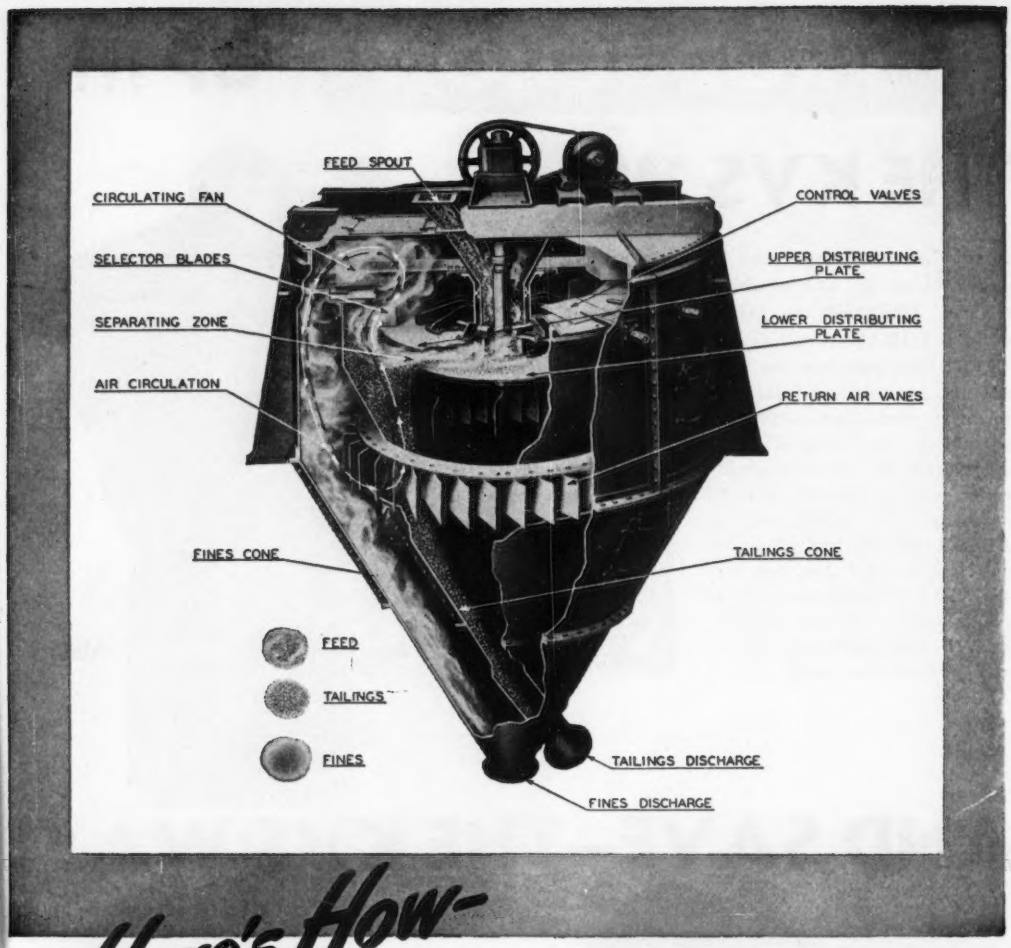
YOU USE KVS . . . .



Here's How—

STURTEVANT AIR SEPARATORS

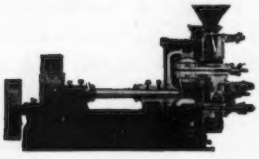
Produce accurate fines with increased output up to 300%

Exact regulation and control of centrifugal forces and air currents, one counteracting and overbalancing the other so precisely that by simple adjustments a product of almost any desired fineness is selected and collected, while coarser sizes are rejected . . . that's the principle of operation of Sturtevant Air Separators.

The benefits you derive from this separator are—increased output by as much as 25% to 300% . . . lower power costs by 10% to 50% . . . reduced maintenance.

A typical on-the-job example is as follows—a 16 ft. separator takes a feed of 750 tons per hour containing only a small percentage of the desired product and delivers 30 tons of material 90%, minus 200 mesh.

Investigate Sturtevant Air Separators today. Write for information and bulletin.

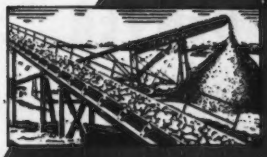


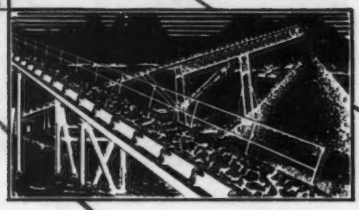
RING ROLL MILL

Capacities from 12 to 18 tons per hour. Range 10 to 200 mesh. Use this mill in closed circuit with Sturtevant Air Separators.

STURTEVANT
MILL COMPANY
101-A *Clayton Street, Boston 22, Massachusetts*
Designers and Manufacturers of
CRUSHERS • GRINDERS • SEPARATORS • CONVEYORS
MECHANICAL DENS and EXCAVATORS • ELEVATORS • MIXERS

Lower Cost per Ton Conveyed





Homocord CONVEYOR BELT

"Costs less, because it lasts longer . . ."

That's the way users look at Homocord.

And it's not just luck that makes it last longer . . . Homocord is designed from the "heart" out specially and only for conveyor belt use.

It has extra cushion, extra troughability, extra draw-bar strength — the qualities a belt must have to last longer under the heavy impact loading of big lumps, long hauls of modern mining, quarrying and earth moving.

Bulletin 6906 tells more of the technical advantages of Homocord Conveyor Belts. We'll mail you a copy on request.

Our hose, V-belts and flat belts are also designed to lower your costs. Your R/M Representative tells you how.

RM

MANHATTAN RUBBER DIVISION — PASSAIC, NEW JERSEY

RAYBESTOS-MANHATTAN, INC.

Manufacturers of Mechanical Rubber Products • Rubber Covered Equipment • Radiator Hose • Fan Belts • Brake Linings • Brake Blocks • Clutch Facings • Packings • Asbestos Textiles • Powdered Metal Products • Abrasive and Diamond Wheels • Bowling Balls

Gold bearing froth on one of the forty No. 24 Denver "Sub-A" Flotation Cells at MacLeod-Cockshutt Gold Mines, Ltd., Geraldton, Ontario, Canada.

OVER 90% of all FLOTATION PLANTS IN CANADA USE DENVER "SUB-A"

Here's Another Reason Why...

93% RECOVERY OF GOLD IS BY DENVER "SUB-A" FLOTATION

PROBLEM: *At MacLeod-Cockshutt Gold Mines, Ltd., Geraldton, Ontario, gold is intimately associated with sulphides—either in miscroscopic form or in solid solution. Extreme fine grinding of sulphides will not liberate gold to permit maximum economic recovery.*

SOLUTION: Denver "Sub-A" Flotation concentrates refractory sulphides. *(About 93% of the gold is contained in 23% by weight of concentrates.)*

Concentration of refractory sulphides permits preferential treatment (by roasting) which would not be economically possible if directed at whole tonnage milled.

PROOF *of the fact that Denver "Sub-A" Flotation will help your mineral recovery is the thousands and thousands of Denver "Sub-A" installations all over the world and the many operations now changing to Denver "Sub-A" Flotation.*

Denver "Sub-A's" are Standard Flotation machines — flexible to meet flowsheet changes and special problems of your ore.

Write today. *Prices and summary of additional advantages will show how you, too, will profit more with Denver "Sub-A" Flotation.*

PUBLICATION AVAILABLE

DECO TREFOIL (September-October issue 1951) carries the complete story of MacLeod-Cockshutt gold milling. Your copy will be sent on request. Please indicate your connection with the mining industry.

DENVER EQUIPMENT COMPANY 24 HOUR SERVICE

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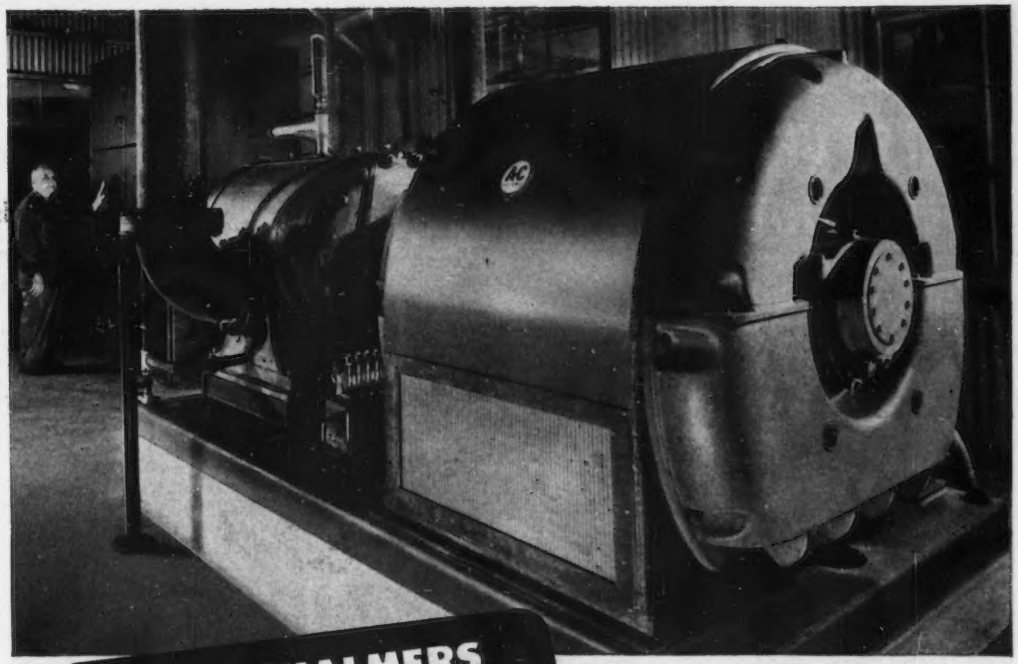


All Allis-Chalmers installation: 250-hp, 495-rpm, drip-proof cage motor; single-stage rotary compressor; controller.

ALLIS-CHALMERS Large Motors ... Provide Low-Maintenance Reliability

START with construction features that have already earned a reputation for ruggedness and reliability. Add all-around drip-proof and mechanical protection. And do this without sacrificing accessibility for routine maintenance

That's how Allis-Chalmers large cage motors were redesigned. That's why you'll want these advantages in your new motors:

IMPORTANT FEATURES

● Rigid cast-iron end shields assure you of correct bearing alignment and corrosion resistance as well as drip-proof protection.

● Capsule-type bearing housings enable you to leave the bearings and oil supply sealed against abrasive dirt when you remove the top halves of the end shields to clean the windings.

● Large air discharge openings in the yoke invite you to keep the ample passages back of the stator core clean and unobstructed. They also make installation easier.

● Louvers on air discharges and design of intakes keep foreign objects out of the motor.

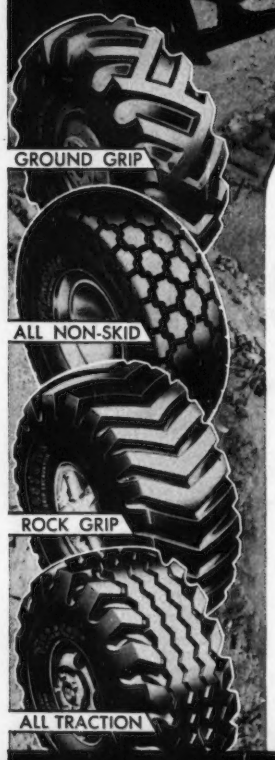
A-3513

NEW BULLETIN

Built in ratings from 60 hp at 300 rpm to 1750 hp at 1800 rpm, these cage motors are described in detail in bulletin 0587542A. Ask your nearby Allis-Chalmers representative for a copy, and see for yourself why these redesigned motors provide a new low in maintenance and a new high in reliability. Allis-Chalmers, Milwaukee 1, Wisconsin.

ALLIS-CHALMERS

LESS DOWNTIME *for Tire Changes*
LESS UPKEEP *for Tire Repairs*
LESS OUTLAY *for Tire Replacements*



It's a Fact... It Costs You Less to Run

Firestone
OFF-THE-HIGHWAY TIRES

IT COSTS you less to run Firestone Tires because their treads are extra tough to withstand cutting and abrasion, extra thick to deliver more miles of service. And, whether your work is in sharp rock, loose earth or slippery clay, Firestone Tires have treads especially designed to meet your particular requirements.

It costs you less to run Firestone Tires because their extra-strong Gum-Dipped rayon cord bodies are the next thing to trouble-free. Protected against impact by four special tread plies and guarded against cuts and snags by double-thick sidewalls, they run longer without interruption, remain in better condition for additional retreading.

Firestone Tires cost you no more to buy than other popular makes, cost a considerable amount less to run. Make a note now to buy your next tires from your nearby Firestone Headquarters.

WHEN YOU BUY NEW EQUIPMENT OR REPLACEMENT TIRES, SPECIFY FIRESTONE

Enjoy the Voice of Firestone on radio or television every Monday evening over NBC

Copyright, 1951, The Firestone Tire & Rubber Co.

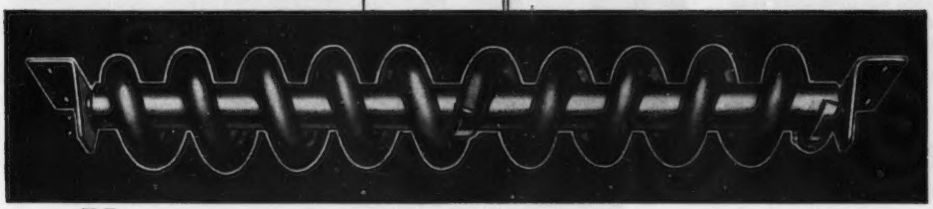
this record proves

THE RETURNS FROM REX SPIRAL RETURN IDLERS

COST RECORD (In a large western coke plant)

TYPE OF IDLER	Steel	Rubber Covered Spiral
SERVICE LIFE	3 months	12 months
COST 1st YEAR	$66.80 for 4	$47.70 each
SAVING 1st YEAR		$19.10
Cost of Replacement		
Subsequent Years (per year)	$66.80 for 4	$18.20 each (rubber covering)

SAVING per year after 1st YEAR $48.60



Yes, the cost record from *just* this one plant clearly demonstrates the savings possible through the installation of Rex Rubber Covered Spiral Return Idlers.

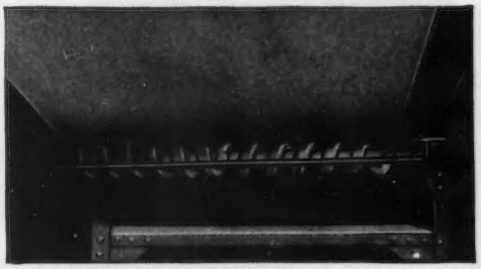
Before the installation of these cost-cutting idlers, the abrasive action of coke breeze clinging to the return side of the belts wore out the standard steel return idlers in an average 3-month period.

15 Rex Spiral Return Idlers were installed for trial and have given at least 12 months' service—4 times longer than the steel idlers. These idlers provide a constant, ever-changing point of contact between idler and belt, preventing build-up of material on the idler and, in some cases, helping to clean the belt.

Cost records show that the 15 Rex Spiral Return Idlers made possible a saving of $19.10 per idler and $286.50 total saving, including initial and installation costs. After the first year, the spiral rubber covering can be replaced, if worn, at a cost of $18.20 per idler. This cost as compared to $66.80, the cost of 4 new steel return idler rolls, indicates a saving after the initial year of $48.60 per year.

Add to these savings, the elimination of down-time caused by the frequent replacement of steel idler rolls, which makes the cost-cutting advantages of Rex Rubber Covered Spiral Return Idlers even more obvious.

Why not investigate the advantages of Rex Spiral Return Idlers and the other idlers in the Rex Line for your operations? Mail the coupon for your copy of Bulletin No. 463R.



Rex Rubber Covered Spiral Return Idlers installed in this western coke plant delivered 4 times longer service than conventional steel return idlers previously used.

CHAIN BELT REX COMPANY — BELT CONVEYOR IDLERS

Chain Belt Company 50-214
1679 W. Bruce Street
Milwaukee 4, Wis.

Please send me a copy of Bulletin 463R.

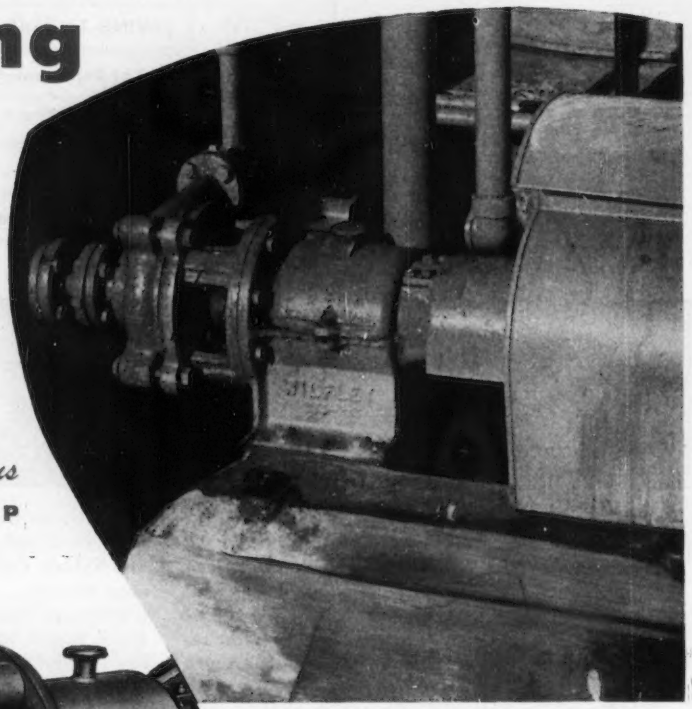
Name.....

Company..... *Dept*.....

Address.....

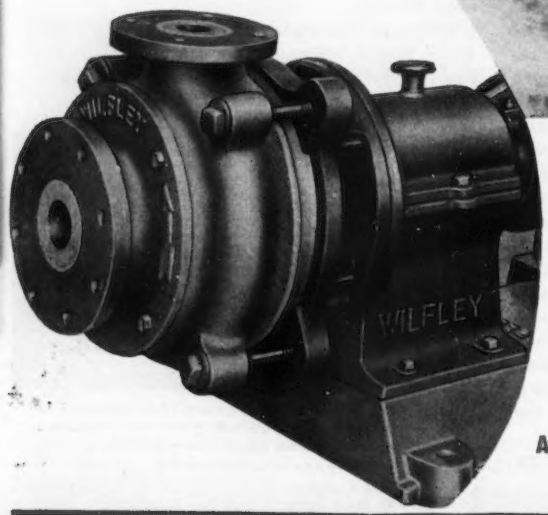
City..... *State*.....

Intermittent pumping



The WILFLEY Acid Pump at right, one of several in an Eastern acid plant, is intermittently pumping chlorine-saturated sulphuric acid, 90-93% concentration, at atmosphere temperature. WILFLEY'S exclusive design and construction make this pump a real cost-saver on this type of application.

Companion to the famous
WILFLEY SAND PUMP



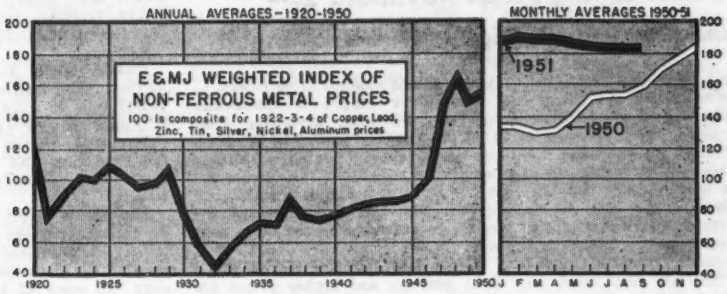
Absolute dependability under the pressure of 24-hour-a-day service has established WILFLEY Acid Pump as the leader in its field. This pump definitely increases production and saves costs in handling corrosives, hot liquids, mild abrasives and other solutions. 10- to 2,000-G.P.M. capacities; 15- to 150-ft. heads and higher. Wetted parts of practically all machinable alloys. Plastic lined models available. Individual engineering on every application. Write or wire for complete details.

A. R. WILFLEY & SONS, INC., DENVER, COLO., U.S.A.
New York Office: 1775 Broadway, New York City

WILFLEY *Acid* PUMPS

E&MJ OUTLOOK

PRICES



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MARKETS

The RFC let bad enough alone on tin all month, and the E&MJ index of nonferrous metal prices held fast at 186.15 as a result. A year ago, it stood at 172.56, and two years ago at 142.24.

Defense Mobilizer Wilson's surprise announcement of higher lead and zinc ceilings and no premiums for imported metal is a step toward more stable markets and improved domestic productivity. Cobalt and fluorspar are also up in price. (See Markets, next page).

•

LABOR

The Phelps Dodge settlement, plus probable metal price increases, lengthen the odds against more labor trouble this fall. However, the tight grip Mine, Mill has on the nonferrous industry may encourage its leaders to risk a more active, and troublesome, drive along the Moscow line.

Hints keep coming up of a bid in the making from left-wing unions like Mine, Mill to get under the wing of John L. Lewis.

•

AT HOME

Peak of the military program seems likely to come in late 1952 rather than mid-1952. It may mean fighting shortages, and keeping controls, well into 1953. Sales of civilian hard goods are running ahead of output, but no real shortages are in sight this year.

The political tangles that seem to enmesh new entrants into the aluminum industry, viz., Harvey Machine Co., are discouraging one or two big metal companies who'd really like to get in.

The ice has broken on the stream of DMPA aid to mining. Three copper contracts were signed last month and more are coming along.

The new tax bill will probably let mining companies deduct up to $75,000 of exploration expense yearly for four years, and recover deferred development costs ratably over the mine's life, instead of by depletion.

Keep your eye on Sherritt-Gordon and Howe Sound. The first will try an ammonia, the second an acid, version of a leaching technique that could revolutionize nonferrous metal production in the next decade.

•

ABROAD

The Monetary Fund's green light on free market gold offerings probably brings closer the day of reckoning on the official price, but experience shows that free markets can't take much larger offerings without price declines until alarm over currency softness increases.

We've been offered a bet that the official gold price will be raised in March, 1953. Any takers?

Lagging European armament and sagging European economies mean greater demands for U.S. aid, or a setback in the military timetable.

MARKETS—Trends and Prices

Lead and Zinc Ceiling Prices Advanced 2¢— Cobalt and Quicksilver Higher—Tin Unchanged

PRODUCTION FOR DEFENSE is expanding, here and in Western Europe, and the difficulties in the way of satisfying the enormous demands for nonferrous metals are endless. No one looks for any improvement in the supply situation over the next six months. Military needs have been rising faster than civilian requirements are falling. Virtually all governments insist that the civilian economy must be maintained at a relatively high level, no doubt for good political reasons.

Workers returned to their jobs at strikebound mines and plants early in September after the Government obtained an injunction to restore vital production. Loss in production of copper as a result of recent labor disputes totaled around 40,000 tons. Lead suffered a setback in output of about 12,000 tons, and zinc production was off 15,500 tons. With imports down, this means that the total available supply from regular sources will be smaller over the next month or so. Industry representatives insist that stockpile metal should be made available for the "emergency," on loan if no other method is acceptable. It was learned late in the month that the Government will release 30,000 tons of copper from the stockpile in the last quarter. This brings the total quantity released so far to 55,000 tons.

Price Index Unchanged

The *E&MJ* price index was unchanged in September at 186.15, thanks to a stable market for tin at the $1.03 per pound basis set by the RFC. Despite opposition in Washington, producers of copper believe that the dual price situation in copper will have to be corrected. Producers of lead and zinc felt the same about their products. Foreign quotations, with a few exceptions of no consequence, are substantially higher than the ceiling prices posted here.

Defense Mobilizer Wilson announced late on Sept. 29 that the domestic ceiling prices of lead and zinc will be advanced 2¢ per pound to encourage greater production. This raised lead to 19¢, New York, and zinc to 19½¢, East St. Louis, effective Oct. 2.

The market for "free" gold moved to higher levels because of a change in policy of the International Monetary Fund in regulating sales of non-monetary gold at premium prices.

Effective Oct. 1, the leading interest advanced its quotation for cobalt metal to $2.40 per pound, up 30¢. Cobalt has been freed from the regulations of the general price freeze.

Quicksilver staged a spectacular recovery pricewise, advancing from $195 per flask to $215. The price advanced on renewed buying to build up inventories reduced in the third quarter. Rumors of a higher price abroad helped. Domestic production is expected to become a factor early next year.

Acid grade fluorspar moved into a tight position and higher prices are likely on both the domestic and imported product. Need for added supplies for the aluminum program is urgent.

Copper Output Drops

Production of copper in the United States was reduced in recent months by the strikes. Statistics for August showed that output of crude totaled 73,977 tons, against 82,577 tons in the preceding month and a monthly average for the Jan.-Aug. period of 86,349 tons. Production of refined copper in this country in August totaled 79,613 tons, whereas deliveries to fabricators amounted to 105,063 tons. Deliveries by producers to fabricating plants in the eight months ended August totaled 877,524 tons. During the same period, fabricators shipped products to their customers that contained 932,330 tons. The extraordinary demands for copper caused fabricators to lower their stocks of refined metal from 290,241 tons at the beginning of the year to 248,984 tons as August ended.

Despite numerous obstacles that stand in the way of a workable agreement for international allocation of copper, spokesmen for the International Materials Conference remain optimistic on the ultimate success of the plan announced late in September. The Chilean authorities have rejected the proposals of the group. It was stated officially that Chile will continue to enjoy the privilege of receiving 20% of the country's output to sell in non-Communist markets at the best price obtainable. At Chile's current rate of production this amounts to roughly 80,000 tons of copper a year and extra income of more than $50 million.

Defense Mobilizer Wilson rejected suggestions that a higher price than 24½¢ per pound for domestic metal would be necessary under prevailing conditions.

Lead Allocations Cut

NPA ordered a cut in September allocations of 35%, owing to the loss in production. This announcement was issued after some consumers had already received their allotment. It caused general confusion in the industry.

United States refineries produced 31,756 tons of lead in August, against 44,864 tons in July, and 47,242 tons in August a year ago.

Imports of refined lead in July were down to only 9,265 tons, making the total for the Jan.-July period 91,990 tons.

The Senate failed to get around to taking action on the suspension of the import duty on lead. However, those close to the situation believe that the duty will come off before the Senate adjourns.

It was considered doubtful whether Congress will do anything at this session on the temporary suspension of the zinc duty. A measure has been readied for consideration in the House. To ease the scarcity of slab zinc, GSA released some metal to consumers that had been earmarked for the stockpile.

The International Tin Study Group met in Rome during the last week of

Average Prices for September (E&MJ Quotations)

Copper:	
Electrolytic, domestic, refinery	24.200
Electrolytic, Export, Refinery	27.425
Lead:	
Common, New York	17.000
Common, St. Louis	16.800
Silver and Sterling Exchange:	
Silver, New York, per oz.	90.160
Silver, London, pence per oz.	78.500
Sterling Exchange, "Checks"	279.921
Zinc:	
Prime Western, East St. Louis	17.500
Tin:	
New York Straits	103.000
New York, 99% min. (e)	102.000
Gold, per oz. U.S. price	$35.000
Quicksilver, per flask	206.250
Antimony (E&MJ) (d)	45.350
Antimony, bulk, Laredo	42.000
Antimony, in cases, Laredo	42.500
Platinum, refined, per oz.	$90.000
Cadmium (a)	255.000
Cadmium (b)	267.500
Cadmium (c)	280.000
Aluminum, 99% plus, ingot	19.000
Magnesium, ingot	24.500
Nickel (f)	56.500

Domestic quotations, unless otherwise stated, are in cents per pound. Sterling exchange checks, in cents. Quicksilver, per flask of 76 lb.
(a) Cadmium average based on the producers' quotation.
(b) Cadmium average based on the average of the producers' and platers' quotation.
(c) Cadmium average based on platers' quotation.
(d) Domestic, 5 tons or more but less than carload lot, packed in cases, f.o.b. New York.
(e) Tin content.
(f) F.o.b. Port Colborne, U.S. duty included.

September. U.S. representatives gave no encouragement to producers of any change in pricing policy by this Government. It was estimated that production of tin during 1951 will exceed consumption by 21,000 tons unless the United States again enters the market for substantial tonnages. The RFC indicated that it is prepared to investigate tin mining conditions in Malaya as an approach to determining a "fair price."

Important consumers of manganese ore were reluctant about closing long-term contracts at prevailing inflated prices.

"Free" Gold Market

The International Monetary Fund announced Sept. 28 that premium transactions in gold will be "policed" by its members to make controls more effective. Inability of the Fund to regulate the premium market caused the shift in policy. Traders do not anticipate important market reaction, but it was felt that the move will advance the date when gold will be revalued. The following prices for "free" gold were compiled by Pick's World Currency Report, per fine ounce:

	Coins		Bars (12.5 kg.)	
	Aug. 30	Sept. 28	Aug. 30	Sept. 28
New York, transit	.....	.....	$42.25	$40.38
Manila	$49.00	$49.50	42.10	42.25
Hong Kong	49.00	49.50	43.65	43.50
Bombay	56.50	58.00	49.50	49.75
Tangier	51.50	54.50	40.45	40.38
Beyrouth	49.50	50.00	40.40	40.63
Paris	56.50	58.50	41.90	43.50
Buenos Aires	51.00	53.50	44.00	45.00

(Markets continued on page 97)

Major Metals

U. S. DAILY AND AVERAGE PRICES

Sept. 1951	Electrolytic Copper (a) Domestic	Electrolytic Copper (b) Export	Straits Tin New York	Lead New York	Lead St. Louis	Zinc East St. Louis
1	No Market	27.425	103.000	17.000	16.800	17.500
3	Holiday	27.425	Holiday	Holiday	Holiday	Holiday
4	24.200	27.425	103.000	17.000	16.800	17.500
5	24.200	27.425	103.000	17.000	16.800	17.500
6	24.200	27.425	103.000	17.000	16.800	17.500
7	24.200	27.425	103.000	17.000	16.800	17.500
8	No Market	27.425	103.000	17.000	16.800	17.500
10	24.200	27.425	103.000	17.000	16.800	17.500
11	24.200	27.425	103.000	17.000	16.800	17.500
12	24.200	27.425	103.000	17.000	16.800	17.500
13	24.200	27.425	103.000	17.000	16.800	17.500
14	24.200	27.425	103.000	17.000	16.800	17.500
15	No Market	27.425	103.000	17.000	16.800	17.500
17	24.200	27.425	103.000	17.000	16.800	17.500
18	24.200	27.425	103.000	17.000	16.800	17.500
19	24.200	27.425	103.000	17.000	16.800	17.500
20	24.200	27.425	103.000	17.000	16.800	17.500
21	24.200	27.425	103.000	17.000	16.800	17.500
22	No Market	27.425	103.000	17.000	16.800	17.500
24	24.200	27.425	103.000	17.000	16.800	17.500
25	24.200	27.425	103.000	17.000	16.800	17.500
26	24.200	27.425	103.000	17.000	16.800	17.500
27	24.200	27.425	103.000	17.000	16.800	17.500
28	24.200	27.425	103.000	17.000	16.800	17.500
29	No Market	27.425	103.000	17.000	16.800	17.500
AVERAGES FOR MONTH						
Sept.	24.200	27.425	103.000	17.000	16.800	17.500
AVERAGES FOR WEEK						
Sept.						
5	24.200	27.425	103.000	17.000	16.800	17.500
12	24.200	27.425	103.000	17.000	16.800	17.500
19	24.200	27.425	103.000	17.000	16.800	17.500
26	24.200	27.425	103.000	17.000	16.800	17.500
CALENDAR WEEK AVERAGES						
Sept.						
1	24.200	27.425	103.000	17.000	16.800	17.500
8	24.200	27.425	103.000	17.000	16.800	17.500
15	24.200	27.425	103.000	17.000	16.800	17.500
22	24.200	27.425	103.000	17.000	16.800	17.500
29	24.200	27.425	103.000	17.000	16.800	17.500

Silver, Gold and Sterling

DAILY AND AVERAGE PRICES

Sept. 1951	Sterling Exchange "Checks"	Silver (c) New York	Silver London	Gold London	Gold (d) United States
1	(e)	(e)	(e)	(e)	$35.00
3	Holiday	Holiday	78.500d.	248s.	Holiday
4	279.9375	90.160	78.500d.	248s.	35.00
5	279.9375	90.160	78.500d.	248s.	35.00
6	279.9375	90.160	78.500d.	248s.	35.00
7	279.9375	90.160	78.500d.	248s.	35.00
8	(e)	(e)	(e)	(e)	35.00
10	279.9375	90.160	78.500d.	248s.	35.00
11	279.9375	90.160	78.500d.	248s.	35.00
12	279.9375	90.160	78.500d.	248s.	35.00
13	279.8750	90.160	78.500d.	248s.	35.00
14	279.8750	90.160	78.500d.	248s.	35.00
15	(e)	(e)	(e)	(e)	35.00
17	279.8750	90.160	78.500d.	248s.	35.00
18	279.8750	90.160	78.500d.	248s.	35.00
19	279.8750	90.160	78.500d.	248s.	35.00
20	279.9375	90.160	78.500d.	248s.	35.00
21	279.9375	90.160	78.500d.	248s.	35.00
22	(e)	(e)	(e)	(e)	35.00
24	279.9375	90.160	78.500d.	248s.	35.00
25	279.9375	90.160	78.500d.	248s.	35.00
26	279.9375	90.160	78.500d.	248s.	35.00
27	279.9375	90.160	78.500d.	248s.	35.00
28	279.9375	90.160	78.500d.	248s.	35.00
29	(e)	(e)	(e)	(e)	35.00
AVERAGES FOR MONTH					
Sept.	279.921	90.160	78.500d.	—	35.00
AVERAGES FOR WEEK					
Sept.					
5	279.9375	90.160	—	—	—
12	279.9375	90.160	—	—	—
19	279.8750	90.160	—	—	—
26	279.9375	90.160	—	—	—

Calendar week averages, New York Silver: Sept. 1st, 90.160; 8th, 90.160; 15th, 90.160; 22nd, 90.160; 29th, 90.160.

(e) No market (Saturday).

THE above quotations for major non-ferrous metals are our appraisal of the important United States markets, based on sales reported by producers and agencies. They are reduced to the basis of cash, New York or St. Louis. All prices, except gold and silver, are in cents per pound.

(a) Net prices at refineries on Atlantic seaboard. To arrive at the delivered New England basis add 0.300c. per pound, the average differential for delivery charges.

(b) Our export quotation for copper reflects prices obtaining in the open market and is based on sales in the foreign market reduced to the f.o.b. refinery equivalent, Atlantic seaboard. On f.a.s. transactions we deduct 0.075c. for lighterage, etc., to arrive at the f.o.b. refinery quotation.

Copper, lead and zinc quotations are based on sales for both prompt and future deliveries; tin quotations are for prompt delivery only.

Quotations for copper are for the ordinary forms of wirebars and ingotbars; cathodes are sold at a discount of 0.125c. to 0.15c. per pound. Quotations for zinc are based on Prime Western brands. Zinc in New York commands a premium over the St. Louis basis equal to the freight differential. Contract prices for High Grade zinc delivered in the East and Middle West, effective Jan. 1, 1951, commanded a premium of 1.35c. per pound over the current market for Prime Western; Special High Grade 1.50c.

Quotations for lead are based on domestic common lead. Corroding lead commands a premium of 10 points.

(c) The daily New York silver quotation reported by Handy & Harman is for silver contained in ores and other unrefined silver-bearing materials, in cents and fractions of a cent per troy ounce. It is determined by Handy & Harman on the basis of actual sales of bar silver .999 fine in amounts of 50,000 ounces or more for nearby delivery at New York, and is usually one-quarter cent below the price paid for such bar silver, this deduction being the allowance for carrying, delivering and marketing. In addition to foreign silver, the quotations also apply to domestic and Treasury silver if such silver enters into the New York market.

The Treasury's purchase price of newly mined domestic silver is 90.5c. per troy ounce 1000 fine, effective July 1, 1946. London silver in pence per troy ounce, basis .999 fine.

(d) U.S. Treasury's gold price. Actual payment by the United States Treasury for gold is at 99.75 per cent of the price quoted by the Treasury, which is equal to $34.9125.

E&MJ HIGHLIGHTS

As you thumb through this issue,

"Killarney" green, a popular Butte color, shines from the Greater Butte drawing (page 71), which took 60 manshifts of ACM-E&MJ time to produce. The drawing is a precise true-perspective view of three orebodies.

The magnetic separator on page 82 has no moving parts, is powered by ac, and looks like a "comer."

Mylrea's speedy zinc assays (page 95) should help to get more zinc to the consumer, less in the tailing pond.

Wanted: Director of the U. S. Bureau of Mines.

After four years of service as director, **James Boyd resigns** effective October 16 to join the executive staff of Kennecott Copper Corp.

Working fast, DMPA has signed three new copper agreements.

Copper Cities will spend $15.2 million to produce 22,500 tons per year by 1954. DMPA will buy up to 85,000 of the first 96,250 tons at 23¢.

North Butte gets $60,000 for working capital, will turn out 3,500 tons of cement copper yearly, and will pay back DMPA with $60,000 of 24½¢ copper.

Phelps-Dodge will spend $25 million to produce 38,000 tons from East-Bisbee. DMPA will buy up to 112,500 of the first 150,000 tons at 22¢.

Quote: "Nothing compares with the scarcity of copper. It is the toughest of all. . . ." Charles R. Cox, Kennecott Copper Corp.

Placing an estimated $75-million bet on magnetic taconite,

Reserve Mining Co. awarded Hunkin-Arundel-Dixon a contract to begin immediate construction of a beneficiating plant at Beaver Bay, a 47-mi. railroad from Babbitt, and other facilities. Completion: 1955 or '56. Feed: 7,500,000 tons at 24%. Product: 2,500,000 tons of 64% pellets.

Last news on the nickel-copper strike in the Duluth gabbro:

Estimated grade, 0 to .4% Ni, .5 to 1% Cu. Strike, northeasterly. Length, 5 mi. of intermittent outcrops. Origin, similar to Sudbury.

ALCOA is now surveying the Rockdale, Texas site for its new

aluminum smelter, has the certificate of necessity, plans to start operations in late '52, and to reach full 170-million-annual-pound production in '53.

Calera Mining Co. hit first production in September when

40 tons of copper con from development ore was shipped to Garfield.

Calumet & Hecla will spend $500,000 for exploration of areas

where surface amygdaloids were barren, but deeper ones proved mineable.

ENGINEERING AND MINING JOURNAL

OCTOBER, 1951

Men on a Hill

THE IMPRESSIVE, interesting "Greater Butte" block-caving project, through which the Anaconda Copper Mining Co. has underwritten a future for its birthplace, is at once a monument to a bounteous natural treasure, a wellspring of technical progress, a town, a great company, and a man. To us in this instance, these things are so much a part of each other that they merge into a single picture.

It is fitting that the main shaft of this project should be named after "Con" Kelley, Anaconda's leader for so many years. He has imbedded into this company so much of his own integrity, courage, vision, drive, and competence that these qualities have become a permanent part of the company's character.

"Con" Kelley has beyond any doubt been a great lawyer, a great executive, and a great leader. However, to us his most admirable quality has been that he has always been and always will be a prospector, full of vision, courage, and a deep craving to dig.

The boards of these large corporations always contain a strong influence of money-minded people who would prefer to take their profits and run. It takes a prospector to keep them in the game, plowing back enough funds to assure a company of a future in the wasting-asset industry.

Apart from the technical grandeur of the Greater Butte Project, the present threat of labor's demands to the continuation of mining at Butte is an appropriate, if sombre, background against which to appreciate that it took courage and vision to launch this expensive development. Butte is not so low-cost that its future is assured by natural conditions.

Butte's proud reputation as "the richest hill on earth" must not be construed to mean that its operating and amortization costs can be passed on to the consuming public if they should prove to be "more than the traffic will bear." In short, despite the impressive wealth that "the hill" still contains, Butte is no longer within that charmed circle of low-cost producers that the consumers of the world must pay for keeping in being whether they like the cost or not. Butte must compete.

Therefore, we hope that the workmen of Butte and the citizens of Butte and Montana will appreciate that Anaconda's venture for their joint future cannot continue without a certain willingness on their own part to help make it live.

Don't Kill the Little Fellow

THE MOST UNPLEASANT FACT about the drift of management-labor relations in nonferrous metal mining toward industry-wide bargaining is the impact on new, small, and higher-cost operations. These are the real victims. The organized workers can always rebel if enough of them find that they are not benefited by being drawn into the orbit of big-time labor politics. The blue-chip operation can expect to pass added costs on to the consumer if the demands of labor threaten its survival. The new, small, and high-cost operations enjoy no such preferred status.

Engineering and Mining Journal certainly has no quarrel with the workman getting his appropriate share of the fruits of economic progress, but it is deeply concerned over the fates of the new, small, and high-cost elements in the mining industry. To this end we have endorsed tax relief, the exploration-aid program, and—if we must have dreary, unimaginative price control—nondiscriminating subsidies. Beyond that we are willing to take a look at any special aid to new, small, and high-cost operations that will not destroy the virility of the industry or place it under the thumb of bureaucracy.

Feeling thus, in the interests of both the industry and the public, we implore the members of the industry who have a hand in labor negotiations to strive desperately to tie collective bargaining to local problems. Only on this basis can justice be done to individual workmen, to marginal elements in the industry, and to the public.

The Greater Butte Project

★ Anaconda's vast new Montana mining venture, shown opposite for the first time in true perspective, gets set for production by 1952

JOHN B. HUTTL, Associate Editor

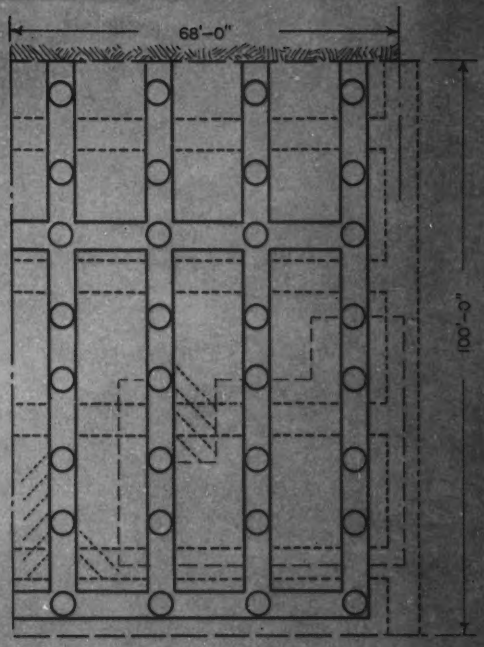
BUTTE, FAMOUS AS A PRODUCER of copper since 1875 and of zinc and manganese since World War I, is experiencing an expansion in underground and surface operations which is influencing the life of the city as well as that of the State of Montana in general. Responsible for this is the extensive work being done at the mines of the camp, and at the reduction works at Anaconda to bring to completion the Greater Butte Project. This project, first announced by C. F. Kelley, chairman of the board of Anaconda Copper Mining Co., was subsequently described by E. S. McGlone, vice president, in the September, 1948, *E&MJ*.

The Greater Butte Project, estimated to cost $27,000,000, involves the exploitation of more than 130,000,000 tons of ore containing at least 20 lb. of recoverable copper per ton, with minor amounts of silver and gold. This tonnage is available in 12 areas or block-caving zones. The orebodies involved are in the eastern part of the hill between the Anaconda and Leonard shafts in the largest and most altered, multi-fractured granite section of the Butte area.

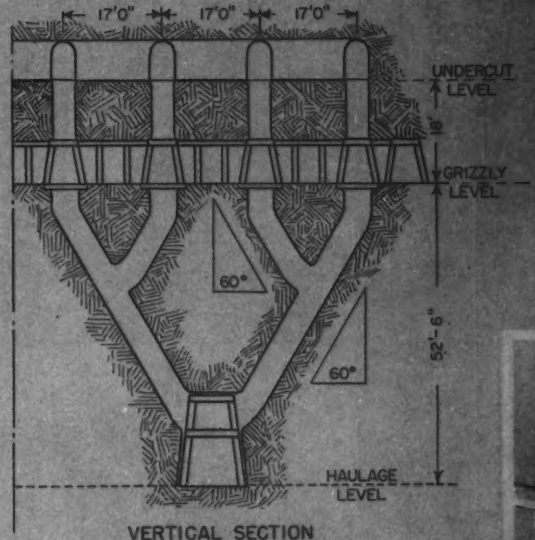
Mining done in the past in these zones consisted of removing high-grade sections of ore by square-set stoping and filling the openings with material too low in copper to be treated at the time. Later, some sections were filled with wet mill tailings under hydrostatic pressure to minimize the fire hazard. This operation was expanded in the areas within the boundaries of the Project soon after the field work on the Greater Butte enterprise started in the fall of 1947. The principal benefits expected from filling are: the elimination of underground fires such as have occurred in the past; the cooling of working places and improvement of conditions; and the stabilization of ground future.

It was originally estimated that approximately 9,000,000 tons of tailings would be required to fill the entire Project area. However, it is now estimated that mining can be started when approximately 3,000,000 tons of tailings will have been introduced into the

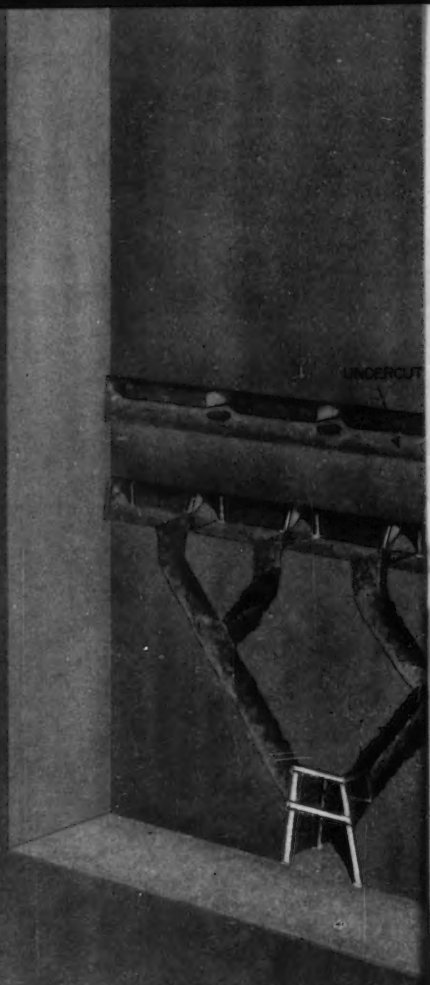
(Continued on page 77)

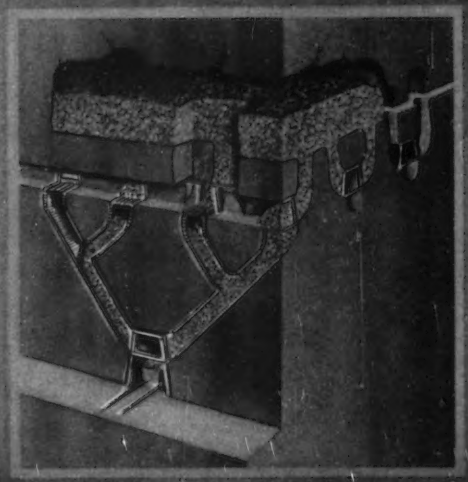


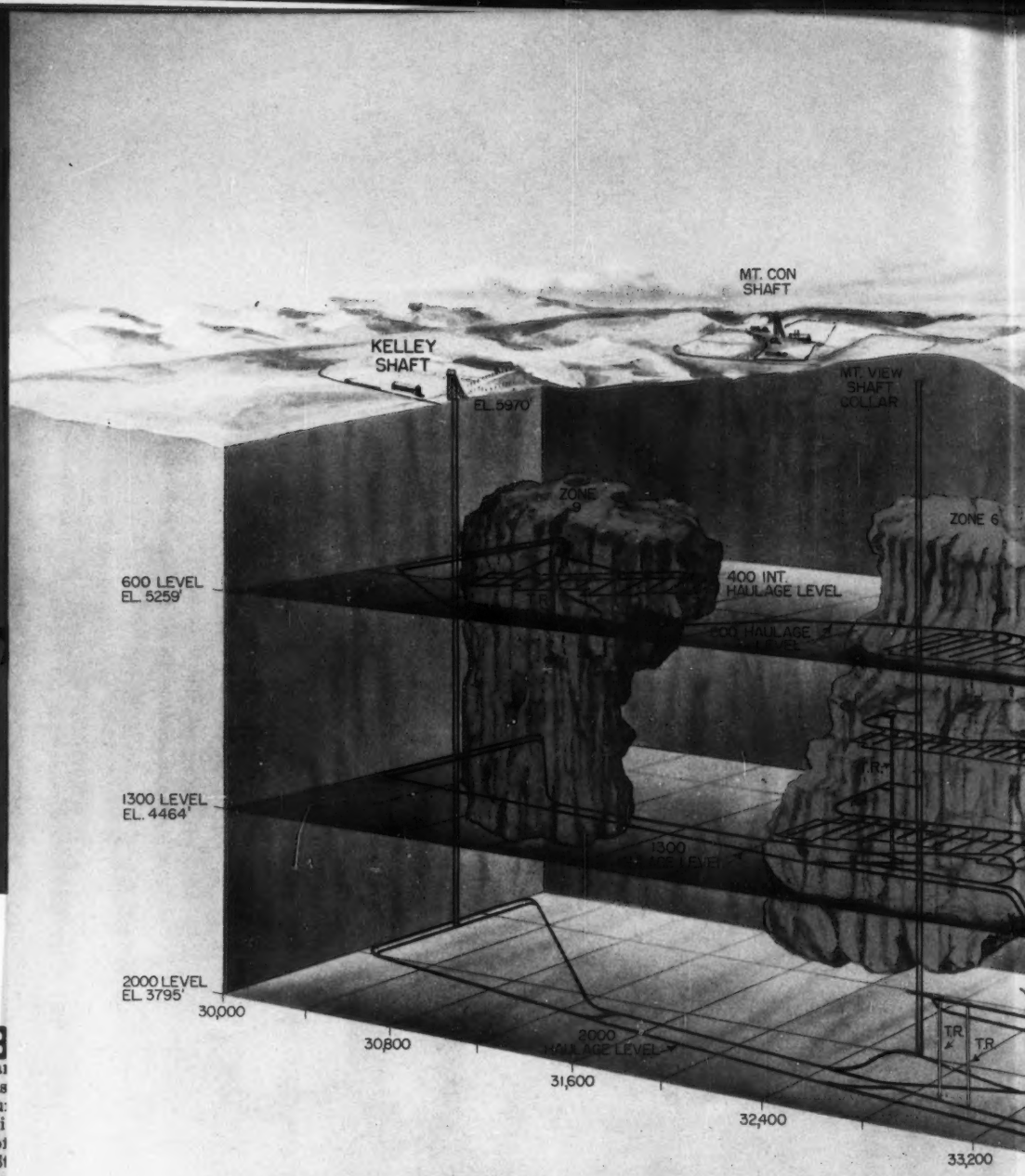
PLAN OF ONE-HALF BLOCK
IN PLANE OF UNDERCUT LEVEL



VERTICAL SECTION
OF RAISE SYSTEM



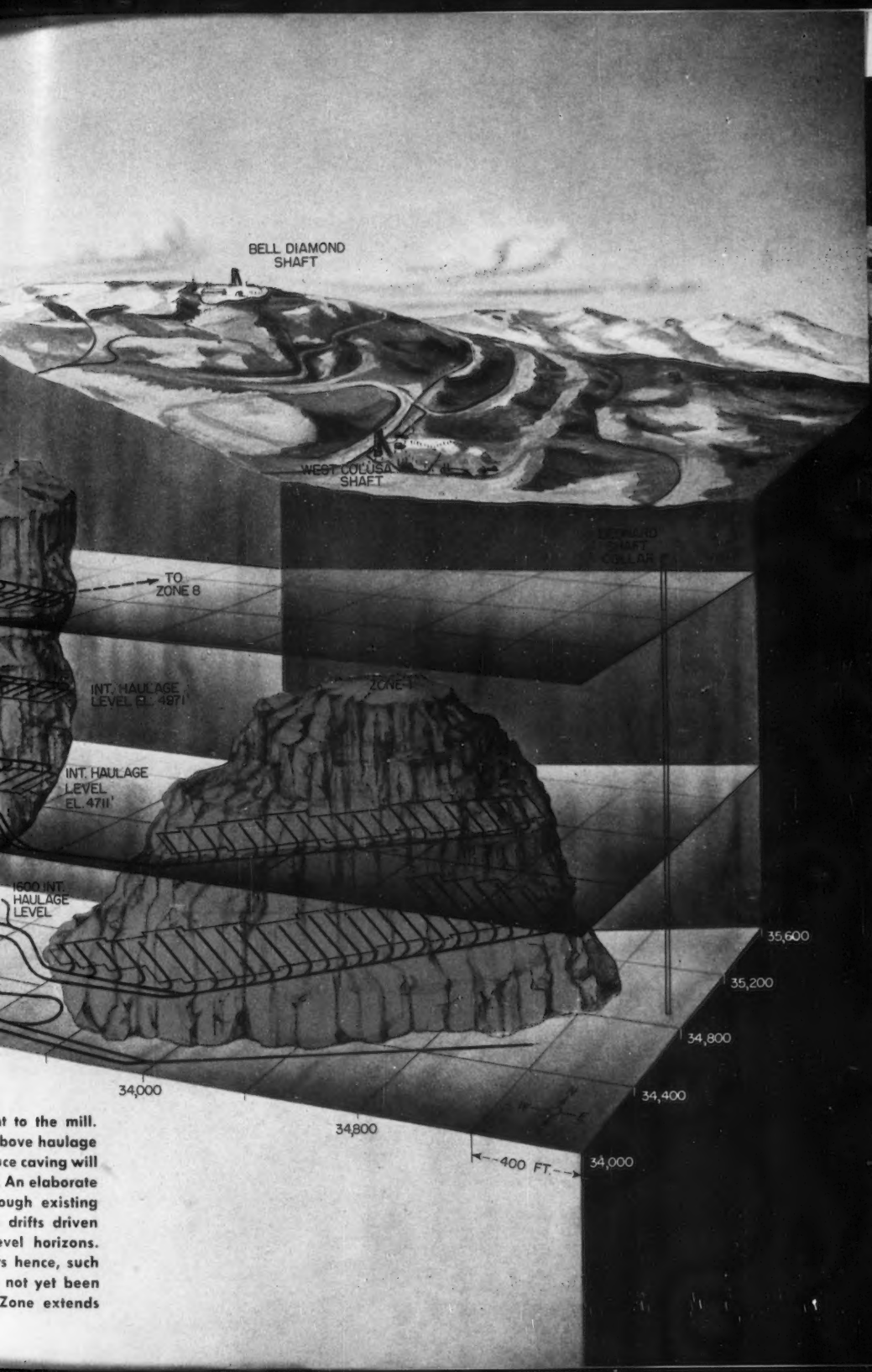




Development Plan for Greater Butte Ore Zones

THIS IS THE GENERAL PLAN OF EXPLOITATION, now partially completed, of three important ore zones of the Greater Butte Project. Twelve zones in all, totaling some 130 million tons of ore averaging 20 lb. of copper per ton will be mined ultimately under this plan. Main haulage levels, intermediate haulage levels (Int.), and transfer raises (T.R.) are shown above, plotted on coordinate grids conforming to actual mine development plans. Details of the block-caving method which will funnel caved ore to the haulage levels are shown on the opposite side of this page. All ore will be hauled to the Kelley shaft, where it will be hoisted to surface storage bins for shipment

Grizzly levels will be established 52.5 ft. ab levels shown here, and undercut levels to induc be blasted out 18 ft. above the grizzly levels. exhaust ventilation system will operate thro shafts in the area, and through ventilation around the caving zones on the grizzly-le Mining operations scheduled for many years as the 2,000 level of the No. 1 Zone, have worked out in complete detail. The No. 1 Z considerably below the 2,000 level.



t to the mill. bove haulage ce caving will An elaborate ough existing drifts driven evel horizons. s hence, such not yet been Zone extends

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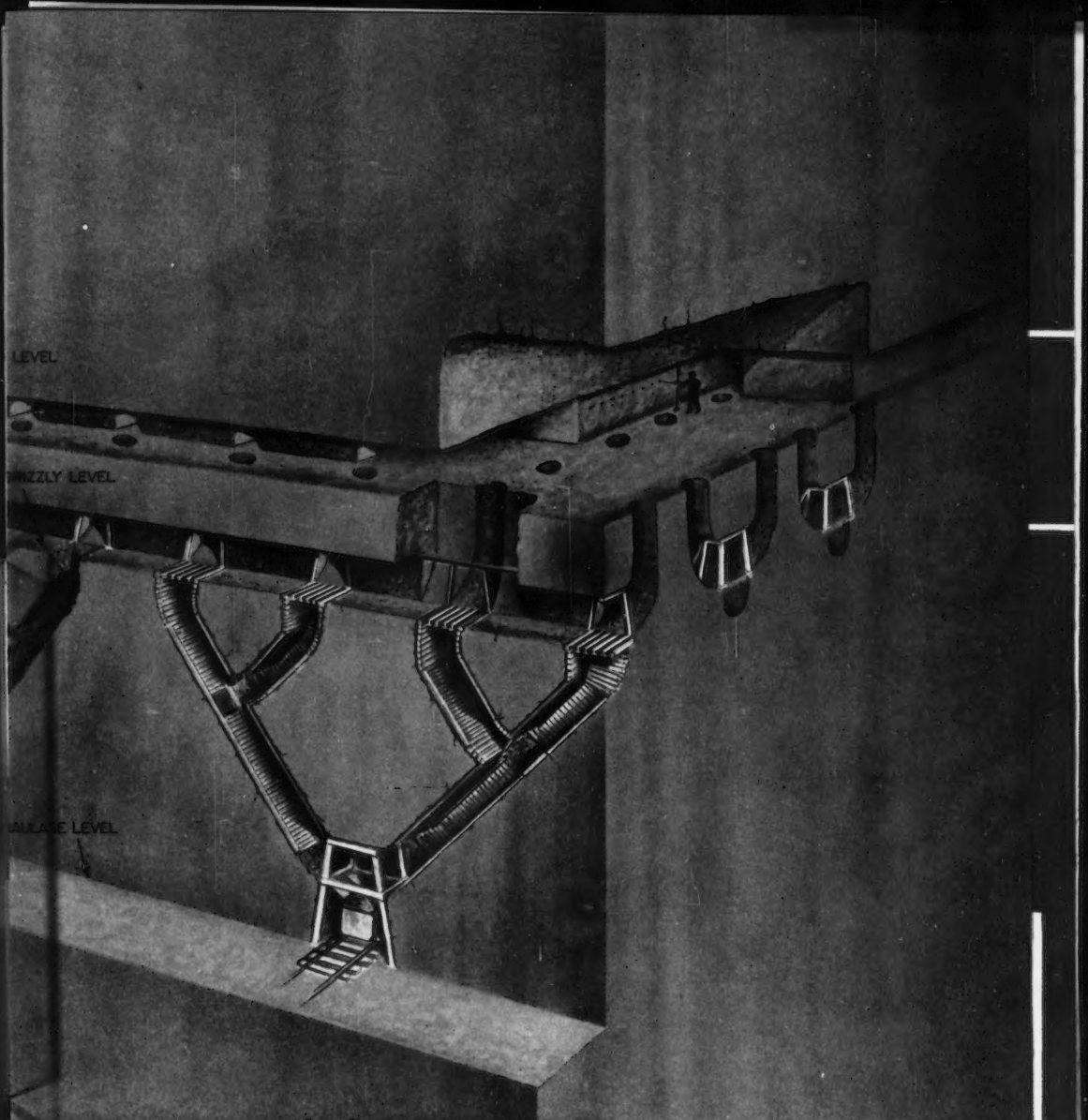
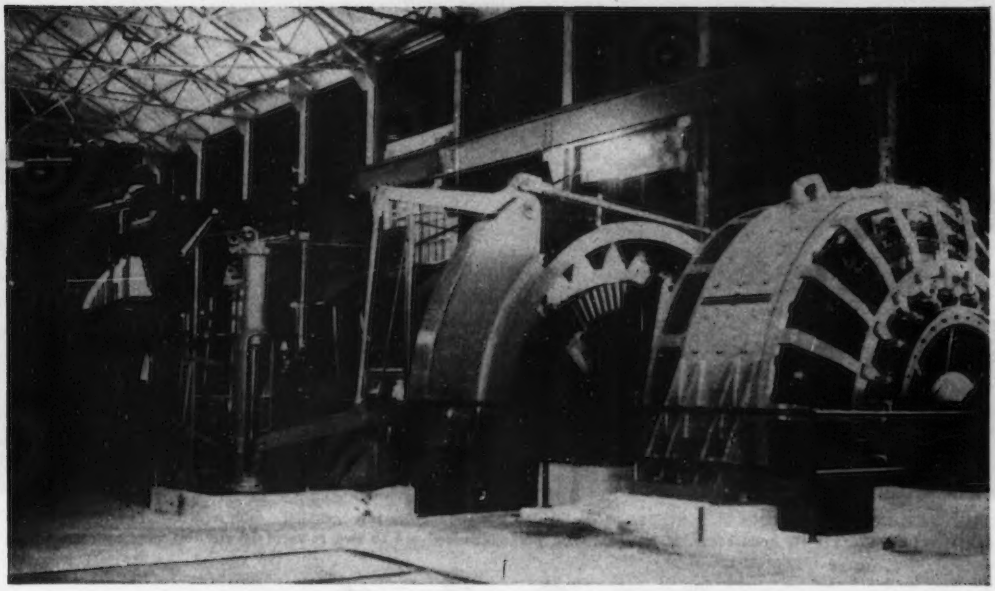


Greater Butte Block-Caving System

AFTER FINGER RAISES and underlying draw-raises have been completed, slab rounds on the undercut level will be drilled in retreat from the near corner of the block thereby inducing caving of the overlying block of ore. Caved ore will then flow through control gates to the grizzlies, and thence through 60-deg. raises to loading chutes on the haulage level.



ORE HOIST AT THE KELLEY SHAFT is one of the largest ever built. This double-drum unit will handle 12-ton bottom-dump skips in balance under semi-automatic control. The 2,000-hp. hoist motor is the world's largest.

portions of the area where mining will begin. Fill material is coming from Anaconda, 25 mi. away, in 50-ton ore cars to the tailings treatment and pumping plants at the St. Lawrence and Tramway mines. Here it is mixed to the proper consistency and pumped through 8-in. pipe to the shafts and thence through 6-in. pipes to the underground openings to be filled. From 3,000 to 6,000 tons is being handled daily at present. As of May 1, 1951, the Anaconda Mine area of the Project had been filled to the 1,300 level, the St. Lawrence to the 800 level, the Mountain View to the 650 level, the Pennsylvania to the 600 level, and the Rarus No. 2 to the 1,100 level. This is the western portion of the Project, and it is here that mining operations will be started. The placement to May 1 had taken about 1,700,000 tons of tailings.

The Kelley Shaft

One of the key units of the Greater Butte Project is the Kelley shaft. This is now being put down, by sinking and raising, to serve as the main access to the caving zones mentioned. Main haulageways are being established on three levels: on the 600 level to serve the different caving zones there, and on the 1,300 and 2,000 haulage levels. From these three horizons a total of 56,000,000 tons of ore is expected to be mined.

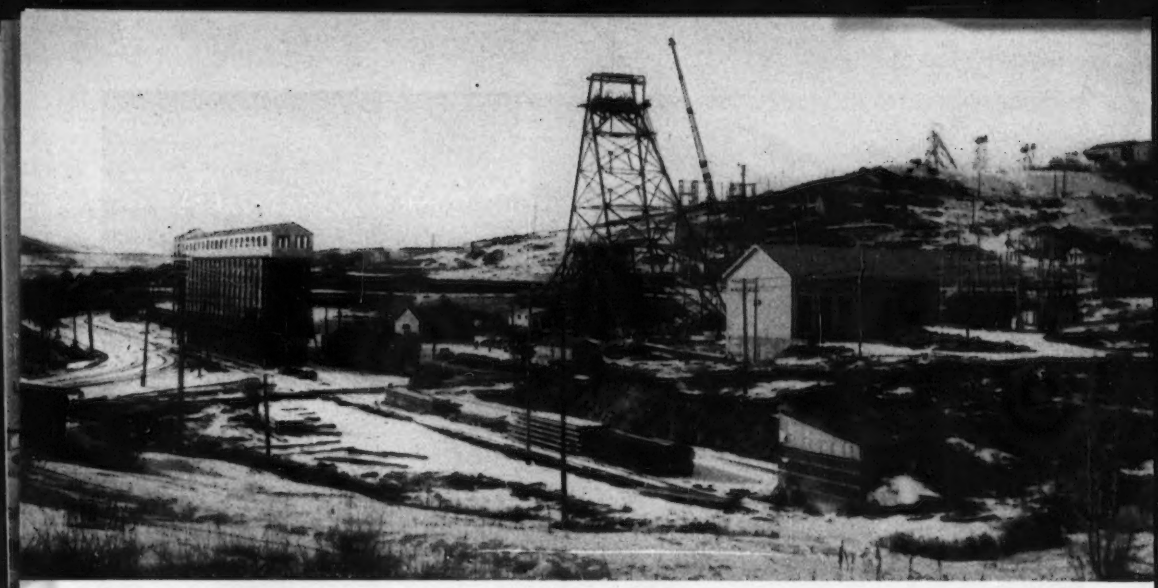
Sinking of the Kelley shaft was started April 17, 1948. With a cross-section of 38 x 9 ft., this shaft is one of the largest vertical mine openings in the country. It is being lined with extra-heavy monolithic concrete to eliminate the fire hazard and reduce maintenance work to a minimum. Prior to the erection of the permanent steel headframe, shaft-sinking equipment consisted of a double wooden headframe structure installed so as to include the north and south ends of the shaft; a double-drum hoist with 54-cu. ft. bottom-dump skips; and a mechanical mucking arrangement. The last comprised two ⅜-cu. yd. clamshell buckets, each operated by three single-drum air hoists and dumping their load onto an air-operated, hinged, feed chute or gate emptying into the skip.

Sinking proceeded at full cross-section to a depth of 104 ft., followed by advance on a 3-compartment basis after a change in the character of the ground occurred at this point. Simultaneously, a 2-compartment raise was started from the 1,500 Mt. Con level. Juncture with the advancing 3-compartment shaft section was made at a point 730 ft. above this level on Dec. 18, 1950. When holed through, the shaft had reached a total depth of 1,361 ft. In February, 1951, 591 ft. had been enlarged to full cross-section and concreted.

Enlarging to full cross-section is done by underhand stoping. The 6-ft., 44-hole round is drilled with sinker drills and ⅞-in. quarter, octagon steel with detachable bits, and blasted with standard 45% Gelex underground powder. Since the new hoist was installed, the broken rock is scraped into a chute discharging into 77-cu. ft. automatic bottom-dump skips, which the hoist handled. The big A-C double drum unit is driven by a 3,000-hp. G.E. motor. The scraper equipment consists of 30-in. scrapers and 15-hp. tuggers. Timbering is done from the top with hanging bolts and carried as close as convenient to the shaft floor. Individual sets are made from 10 x 10-in. timber, and centers from 8 x 10-in. timber.

Placing the Concrete

Special steel forms, three in number, are used in placing the concrete lining. Each is made up of four sections and wedged inserts, held together by simple latch-type locks. Steel reinforcing consists of prefabricated angular and rectangular sections 2½ ft.



SURFACE INSTALLATIONS at the collar of the Kelley shaft include the 178-ft. headframe, a 1,400-ton ore bin, a 36x25-in. jaw crusher, and a 320-ft. belt conveying crushed ore to two rows of 16 circular bins at 7,500 tons.

high and of a length to facilitate quick easy loading into the cage and rapid placing behind forms.

The concrete is mixed in a central mixing plant near-by and trucked to the shaft collar in regular mix trucks. Here it is poured into the funnel at the top of the pipe leading to the point where concreting is in progress. A 20-ft. length of 6-in. hose attached to the discharge end of the supply pipe distributed the concrete. The mix is extra strong, with six sacks of cement per cubic yard of concrete, and 800 lb. of steel reinforcing per foot of shaft. The steel guide boxes used have wing bars to hold them in the concrete. Time required to complete a 5-ft. concrete section is 20 hr. This includes removal of shaft timbers, cleaning up loose rock, setting up steel forms, placing steel reinforcing, and pouring concrete. All concreting operations are carried upward from a given point. The concreted shaft contains three compartments measuring 6½ ft. x 6 ft. 9 in. inside the concrete, and one compartment measuring 13 ft. 8 in. x 6 ft. 9 in. with steel supports embedded in the concrete to accommodate steel dividers, should it be desired to divide the opening into two compartments.

Steel Headframes 178 Ft. High

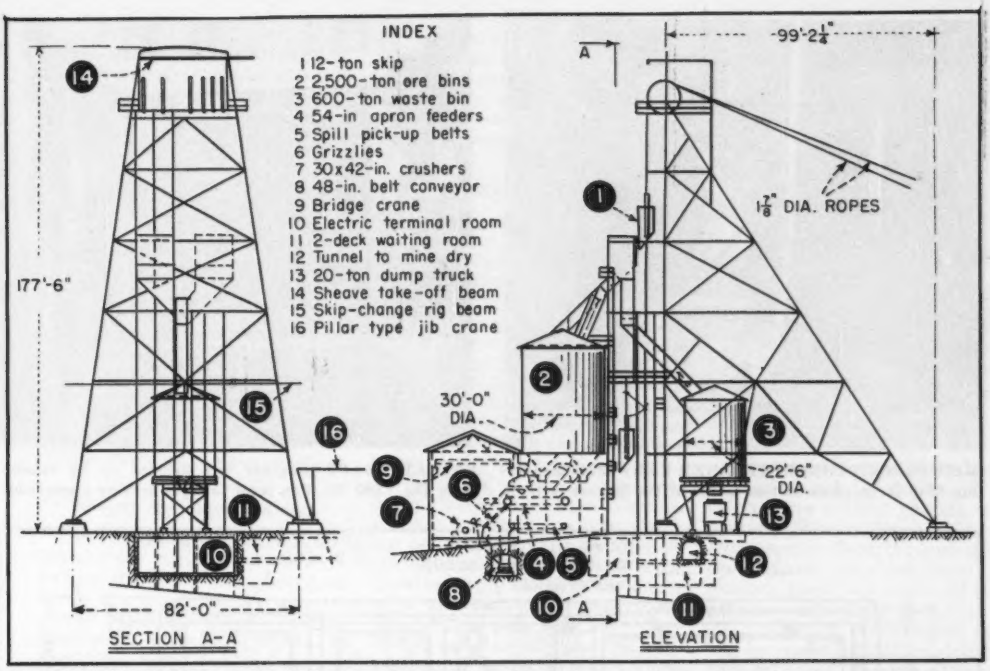
The steel headframe erected over the shaft is 178 ft. high. It carries four 12-ft. sheave wheels. To the west of it is the primary crushing plant. This consists of a 1,400-ton circular steel bin; a 4 x 15-ft. apron feeder; a 5 x 12-ft. vibrating screen; and a 36 x 25-in. jaw crusher set to 6 in. Screen undersize and crusher product are transported to the loading bins by an incline conveyor belt about 320 ft. long. On top of the bins there is a 36-in. belt conveyor with moving tripper. The two rows of 16 circular steel bins hold about 7,500 tons of crushed ore. They are reinforced with steel trusses at the points of juncture and equipped with hopper bottoms and air-operated loading gates.

Other surface structures completed or nearing completion include: the hoist house, a steel-frame building with corrugated steel sheet walls resting on a 24-in. reinforced concrete mat; two idler towers; office; substation; and combination change house, mine foreman-shift boss office, and warehouse. A concreted tunnel leads from the change house to the loading station a short distance below the shaft collar. In this tunnel is an enlarged chamber from which a service shaft is to be sunk sometime in the future to facilitate loading of materials and men. Thanks to the tunnel, the men going into and coming from the mine are never exposed to the weather outside the change house. A similar tunnel leads from hoist house to the Kelley shaft. It carries pipes, cables, and other shaft auxiliaries needing protection.

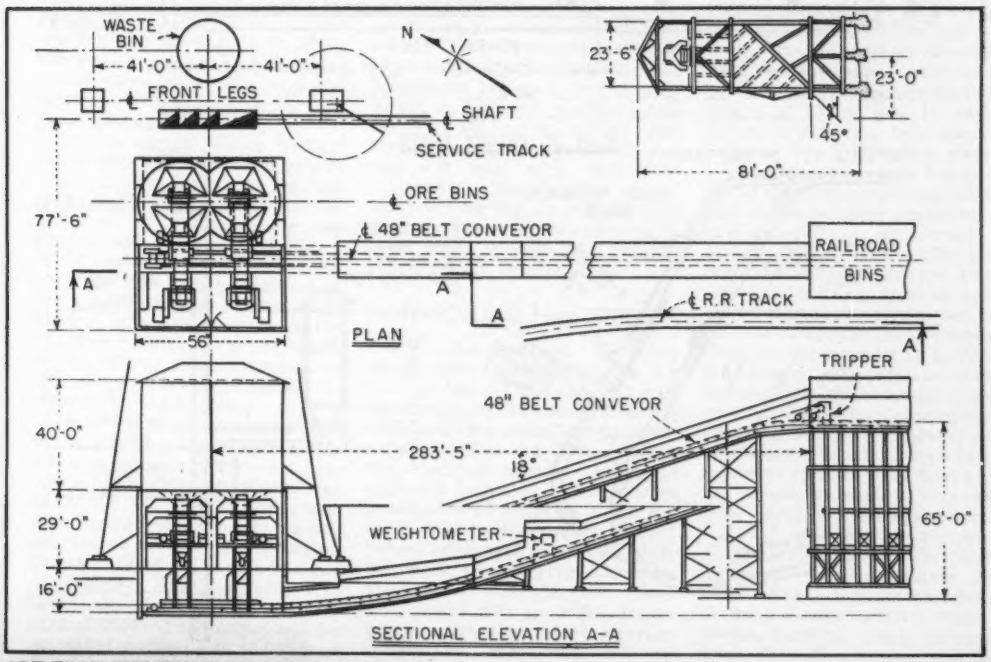
The hoist house contains the new Allis Chalmers-General Electric ore hoist and the Nordberg-Westinghouse cage hoist, the latter having been taken from the Leonard mine. The former, a double-drum hoist, is one of the largest units ever made, and the 3,000-hp. G.E. driving motor is considered to be the largest hoist motor in existence. The drums are 12 ft. in diameter with 8-ft. faces, holding 5,500 ft. of 1⅞-in. cable in three layers. Rope speed is 2,250 fpm., and hoist operation is in counterbalance with 12-ton automatic bottom-dump skips. The clutch is of the multiple-tooth type. Control equipment consists of an electric hoist control installation, with clutch and brake cylinders hydraulically operated. Direct current for the 3,000-hp. motor is furnished by a motor-generator set consisting of a 2,500-kw. generator direct-connected to a 3,500-hp. synchronous motor. The cage hoist, also a double-drum unit, is driven by a 2,250-hp. Westinghouse dc. motor. Both hoists have control equipment for automatic hoisting.

Driving the Haulage Tunnels

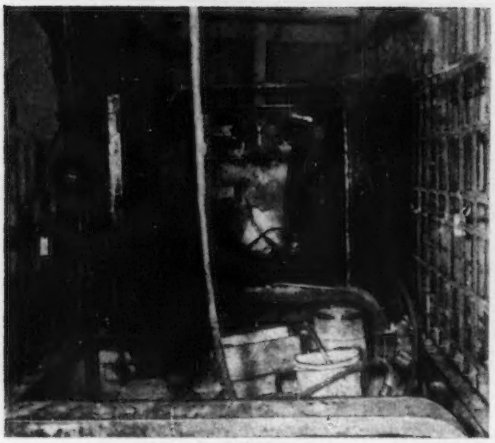
The haulage tunnels on the 600, 1,300 and 2,000 levels are driven 12 x 10-ft. in cross-section. This is done with jumbos mounting 3½-in. drifters with chain feed, using ⅞-in. quarter-octagon steel with



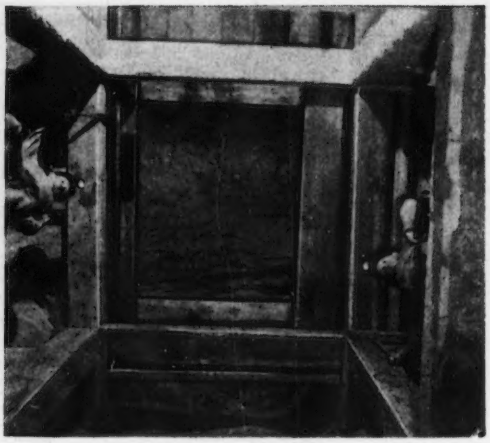
INTERESTING DESIGN FEATURES of the Kelley shaft headframe installation include bottom-dump skips, circular steel ore and waste bins, skip-change facilities, and arrangements to shield miners when entering the cages.



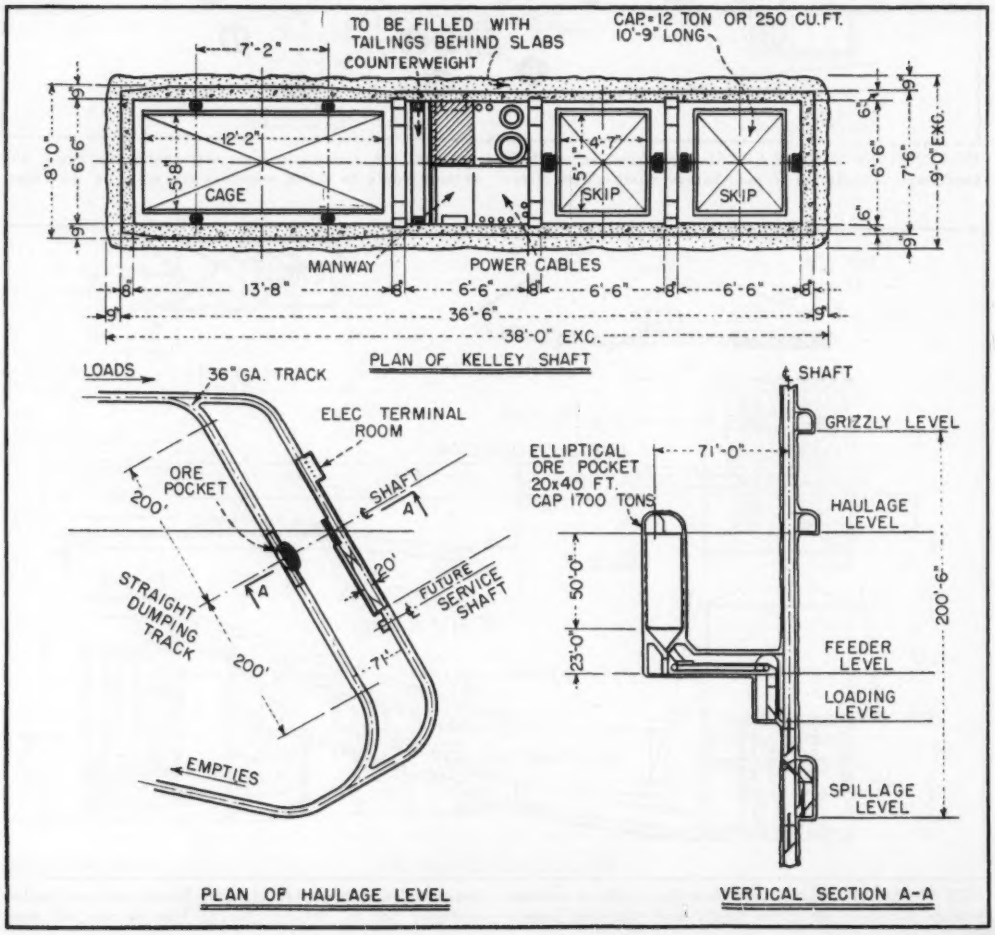
ORE FROM THE SKIPS goes from the 1,400-ton circular storage bin over an apron feeder and vibratory screen into the jaw crusher set at 6 in. Thence over an incline conveyor belt to circular storage bins at the rail side.



REINFORCED CONCRETE-LINED Kelley shaft measuring 38x9 ft. in. cross section is one of the largest in U. S.



KELLEY SHAFT progress was speeded up by raising from the 1,500 Mt. Con level to meet sinking operations.



detachable bits. The round drilled, known as the special research round, consists of 32 to 35 holes, including a five-hole-three-raker burn cut. Depth of round averages 8 ft. Holes loaded with 45% Gelex powder are detonated with electric caps.

The muck broken is loaded into 57-cu. ft. Granby-type cars by mechanical shovels and hauled to the station in trains by 6-ton battery locomotives. Completed tunnel sections will be equipped with 36-in. gage track made from 60-lb. rails. Locomotives will be of the 10-ton trolley type. Early in February, 1951, the southern loops of the three haulage-level systems had been completed to the Kelley shaft, with the northern loops rapidly nearing the same objective.

Mining by Block Caving

Two experimental blocks established since initiation of the Project on the 600 level proved that Butte ore caves readily and requires little secondary blasting. One block was 100 x 136 ft. in horizontal area, and the second, east of the first with a 10-ft. pillar between, was 120 ft. wide and 160 ft. long. The grizzly level was established at 52.5 ft. above the floor of the haulage crosscut, and the undercut level at 18 ft. above the grizzly. A total of 64 finger raises extended to the undercut level, each finger tapping 212.5 sq. ft. of undercut area.

In the second block, vertical raises were extended to the grizzly drifts 36 ft. above the haulage level with finger raises to the undercut at 18 ft. above the grizzly, each finger tapping 300 sq. ft. of undercut area. Also, this block had one haulage crosscut in the center, instead of two as in block 1, with slusher drifts on the first floor running the entire length of the block. Copper content of the ore mined approximated the estimated grades closely.

Total wet tonnage shipped from the trial caving blocks to the 500-ton concentrator section at Anaconda for metallurgical tests was about 600,000. Blocks now under development follow closely the layout shown in the accompanying drawing. Production on a basis of 5,000 tons a day is scheduled to begin sometime during the first part of 1952. This output will be increased gradually to 15,000 tons as mining progresses on the lower levels. It is important to note that this production does not replace but augments that obtained from mining high-grade ores in other sections of the Butte district. This means that copper output from Butte mines will continue at a high level for many years to come.

A Flowsheet Is Developed

Test work to develop a process for treatment of the ores produced by the Greater Butte Project was started in 1943. The oxidized nature of the first 30,000,000 tons of ore to be mined from the upper levels and the presence of considerable copper and iron sulphates made treatment by standard alkaline-circuit flotation difficult. As a consequence, numerous treatment methods and processes were tested and investigated, leading to the selection of the process now being installed at the concentrator. Briefly, it involves scouring and desliming crushed ore in special scouring mills and drag classifiers, the clean sands going to a conventional lime-xanthate flotation circuit, and the slime containing most of the oxide copper, soluble copper and deleterious leachables from wood and ore to a leach-precipitation-float plant, which will use sponge iron as a precipitant. For treating the sands six grinding sections are being installed in the concentrator, each capable of handling 2,000 tons. Equipment for each section comprises a 1,000-ton circular steel fine-ore bin with special felt feeder; a 9 x 12-ft. rod mill; and two 8-ft. ball mills with rake classifiers. The flotation equipment serving the six sections consists of 21 flotation machines of 14 cells each, divided into parallel roughers and cleaners.

H_2SO_4 Will Help Scour

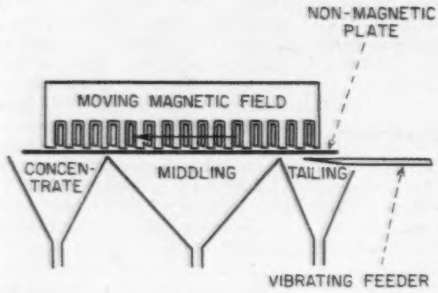
The scouring and desliming plant under construction at the head of the six fine-ore bins will contain several 10 x 12-ft. scouring mills and drag classifiers for separating the sand and slimes. To aid the scouring process, sulphuric acid will be added to the mill at predetermined intervals. Resultant sands will be thoroughly washed before being sent to the rod mills, the wash water being added on the deck of each classifier. The acid slimes will go to the leach-precipitation-float plant nearing completion. Here, they will receive successive treatment in a 50-ft. agitator; 28-cell precipitator receiving sponge iron at three specified points; a 12-cell conditioner; two banks of 15-cell roughers; 6-cell secondary conditioner; two banks of 10-cell secondary roughers; and a 6-cell cleaner. Tailings from the secondary roughers and the cleaner will go to a 20-ft. hydroseparator, with the underflow receiving final treatment in a magnetic separator. Concentrates produced by the 6-cell cleaner will join those produced in the regular flotation sections operating in the concentrator for smelting in reverberatory furnaces. Iron recovered by the magnetic separator will be returned to the 28-cell precipitator.

Make Own Sponge Iron

Sponge iron for use in the leach-precipitation-float plant will be produced in a plant nearing completion a short distance above the concentrator. Here, the high-grade iron calcine received from the roasting plant and resulting from roasting pyrite concentrates for the production of sulphuric acid, will be preheated and roasted in a Bruckner-type furnace, followed by treatment of the hot discharge, with slack coal added, in a Bruckner-type reduction furnace operated at 1,850 deg. F. The furnace will be equipped with an 8-in. boring bar to remove accretions from furnace walls. At this temperature the iron is reduced to the extent of 85 to 90% by carbon monoxide resulting from reaction between coke and carbon dioxide.

The reduced product leaves the end of the furnace through a chute kept under reducing conditions by raw natural gas to prevent re-oxidation of the iron. After passing through a Baker-type cooler sealed at both ends from air entry, the cooled product is elevated to a circular steel storage bin, whence it passes successively to a vibrating screen, magnetic separator, hammer mill, whizzer, and storage and loading bin. Coke removed from the magnetic separator goes to a storage bin for reuse in the reduction furnace. The final product, minus 35 mesh in size, contains about 50% metallic iron.

E&MJ expresses its thanks to E. S. McGlone, vice president, Anaconda Copper Mining Co., Butte, Mont., for his permission to publish this article; also to Messrs. Linforth, Steele, Kennard, Sims, Mitchell, Lemmon, and Bernard, all of whom have greatly assisted in gathering the information presented.



OPERATING PRINCIPLE of new-type separator involves setting up moving magnetic field in pole piece, which is like stator of ac motor laid out flat. Minus 40-mesh ore feed clings to nonmagnetic plate; magnetic fraction slides across.

TABLE I. Results Achieved By 3-Phase AC Magnetic Separation On Iron Ores

Ore	Product	Weight %	Analyses Fe %	Analyses SiO_2 %	Recovery Fe %
Old Bed Mine, Republic Steel Corp., − 42 mesh	Raw	100.0	69.8		
	Conc.	94.0	72.2	0.19	98.7
	Tail	6.0	15.6		1.3
Chateaugay Mine, Republic Steel Corp., − 42 mesh	Raw	100.0	65.5		
	Conc.	90.1	71.9	0.27	98.7
	Tail	9.9	8.4		1.3
Taconite Concentrate, Babbitt, Minn.	Raw	100.0	63.6		
	Conc.	96.3	66.2		99.1
	Tail	3.7	14.6		.09
Taconite Concentrate Aurora, Minn.	Raw	100.0	61.3		
	Conc.	95.6	64.0		98.2
	Tail	4.4	25.0		1.8
Bondgruvan Magnetite Surahammar, Sweden − 30 mesh	Raw	100.0	62.7		
	Conc.	84.0	67.5		90.3
	Tail	16.0	38.2		9.7

Three-Phase A.C. Can Improve Fine-Size Magnetic Separation

SVEN EKETORP
Research Fellow
Ontario Research Foundation
Toronto, Ont.

ALTHOUGH THE PRINCIPLE has not as yet found widespread use, it is quite possible to build a magnetic separator to operate on 3-phase alternating current. In fact, such a separator, tested at the Ontario Research Foundation, has given improved results in cleaning various iron ore concentrates, ores, and metal powders.

This separator, described in this article, works best on a dry feed crushed to at least minus 40-mesh. Some results are given in Table I. Note, for example, the improved grade of concentrate obtained in treating New York magnetites.

All magnetic separators now in commercial operation on iron ores use a strong magnetic field induced by a direct current. This works well for the most part, but is less satisfactory in treating the finer particle sizes of ores.

Here, the particles are picked up *en masse*, the magnetic particles forming clusters that entrap nonmagnetic particles. Some means must be provided to break up these clusters or prevent their formation.

Aside from sprays, which are not completely effective, attempts have been made to use ac in combination with dc, thus applying a stirring action to the field itself.

Other attempts have been made to use ac fields alone. When applying ac fields, it is possible either to make use of the movement of the particles due to hysteresis, or to let the particles travel in a moving magnetic field. To the first group, which is suitable for weak magnetic materials, belong machines proposed by *Zander*[1] and *Mordey*[2] both of whom make use of the fact that magnetic particles are repulsed from a magnetic field induced under vibrating shelves or belts while nonmagnetic particles are transported on the belts without being affected by the field. *Dean* and *Davis*[3, 4, 5] use the hysteretic repulsion in such a way that the material is fed onto a number of belts at a certain angle to the horizontal. The nonmagnetic particles travel along with the belt and the magnetic ones depart sideways from them. The same type of arrangement is used by *Schilling* and *Johnson*[6] who, however, use a dc drum ahead of the ac fields.

To use a traveling magnetic field as a means of magnetic separation seems simple and natural. In such a field the magnetic particles move along with the field and at the same time they are given an intense rotating motion. *Granigg*[7,8] built laboratory apparatus according to this idea and proved that very clean concentrates could be produced. *Sittig*[9], who made a thorough investigation of magnetic separation of magnetically roasted Mesabi ores, tried wet magnetic separation with traveling ac fields, together with combinations of dc and ac, and seems to have obtained good results with this arrangement.

The 3-phase field in an ac separator is actually nothing else than a stator field in a normal ac motor laid out flat instead of being round and closed. In an investigation by the U.S. Bureau of Mines on sponge iron, a normal stator field was used directly as a laboratory tool for magnetic separation of sponge iron from gangue[10].

The ideas put forward by Granigg were developed and put into practical use by *Eketorp* and *Varming*[11]. A preliminary description of this 3-phase separator and some separation results have been given earlier[12,13].

Construction Details

The 3-phase separator consists simply of a flat magnetic field under which is fed the material to be separated. (See sketch.) Laboratory separators have a pole-stand 3 in. wide and 2 ft. long, while commercial machines are 3½ ft. wide and 2½ ft. long. The best type of feeder is the vibrating type, which feeds a uniform layer of material to the magnetic field. The magnetic poles are covered with a nonmagnetic plate so that the material does not come into contact with the poles but is held at a certain distance from them.

The nonmagnetic materials drop off immediately into the tailing bin and the magnetic particles travel along with the field to the concentrate end where they are taken off. As they travel, the particles rotate in the field. That this is the case can be shown easily by holding the eye of a needle in the field. It will rotate rapidly. In mixed grains the magnetic forces induced will not be strong enough to enable them to travel as fast and as far as the pure magnetic particles. They will therefore fall off at some distance in between the tailing and concentrates off-takes in the middling bin.

The pole stand is built up of transformer sheet steel. The slots cut out from the package of sheet steel have equal tooth and slot width. Optimum conditions are reached when the slot width is about ¼ in. If wider slots are used the magnetic field is too deep and the particles are removed too far from the pole stand and, therefore, are not held to the poles as strongly as required. With too narrow slots the magnetic particles travel more slowly and are held too firmly to the poles.

The coils are placed in the slots in a 3-phase, 2-layer, one slot per pole per phase, half-coil winding. Power consumption for a magnetite concentrate will be of the order of 10 kwh. per ton but will vary greatly with the capacity which, in its turn, depends on a lot of factors. The power factor for the separator is very low, being about 0.15, since it is equivalent to a motor operating without load. If many separators are to be used at one plant it may pay to install a condenser to correct the power factor. The normal frequency of 60 cycles per second should be used, but slightly better results may be had at lower frequencies. However, they are not so apparent that the installation cost of a frequency generator would then be justified.

The nonmagnetic plate under the poles is preferably of stainless steel. Copper or aluminum plates could also be used, as well as wood or glass plates, but stainless steel gives the best capacity in the separation. The thickness of the plate is of importance as optimum conditions are reached when the material moves on the "tops" of the sine waves of the field.

Operational Data

If the magnetic and nonmagnetic particles in the material to be treated are completely physically separated from each other so that no mixed grains are present, the tailing will show a low amount of magnetic particles. The concentrate will be extremely pure and contain very few nonmagnetic particles.

If mixed grains are present they will be drawn toward the magnetic field to some extent but will not be able to travel the whole way over the surface of the magnet, especially as they have to compete in their traveling with the pure magnetic particles. The mixed grains collected in the middling bin should be reground and recycled to the apparatus if the amount of them is of any importance.

The reason why this apparatus gives such high-grade concentrates must be that the particles move more or less individually over the surface of the magnet, and that during the separation they are in an intense movement. In a recent paper by *Mortsell*[14], in which he compares different types of equipment for the magnetic analyses of ores, it is stated that 80 to 100 separations with a stationary magnet were necessary to completely remove all gangue from the magnetic ore substance. In the 3-phase separator, which has at least 48 poles, the particle will be lifted and dropped 48 times and on top of that be rotated and shaken in its movement between the poles.

The capacity of the separator will be determined by the speed at which the magnetic particles are removed from the feeder by the moving magnetic field. If too much material is fed into the separator the gap between the feeder and the nonmagnetic plate, which is about ⅜ in., will be clogged up. The feeder should be set just short of a rate at which this does not happen.

Magnetites and other magnetic oxides give the highest capacity, being about 2,000 lb. per hour for a field 3½ ft. wide.

For iron powder, where the remanence of the material is much higher, the capacity goes down to 300 to 500 lb. per hour. The purer the powder, i.e., the less oxide it contains, the lower the capacity.

Another important factor is grain size. Particles larger than 30 mesh will not travel easily along the poles. The highest traveling speed is obtained with particles 100 to 150 mesh. No material to be treated should be larger than 40 mesh.

The capacity depends also on the thickness of the nonmagnetic plate and the strength of the field. The highest possible power input should be used which does not heat the pole stand above allowable limits. Water or air cooling can be applied to make it possible to increase the current to the highest possible value.

The 3-phase separator has so far only been used in dry separation. In water the field strength of the poles is not sufficient to make the magnetic particles move. *Sittig*[9] has constructed laboratory apparatus using a higher number of slots per pole, thereby obtaining a deeper field and higher field strengths. He reports that such an apparatus can be worked satisfactorily.

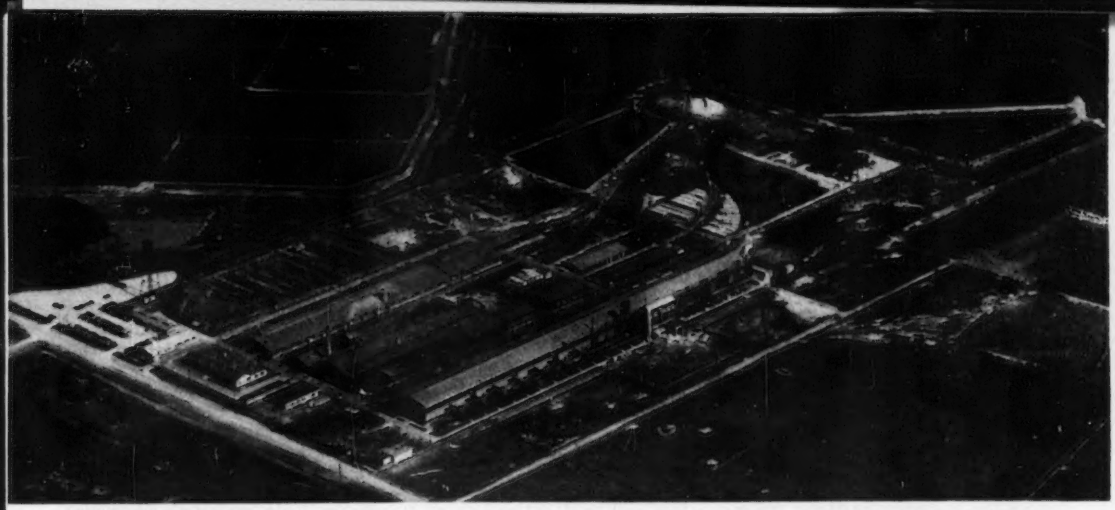
Magnetic particles at the far end of the pole stand will drop off by themselves if the grain size is sufficiently small and the product is magnetite. If iron powder is treated, the magnetic particles will stick to the poles and will have to be removed either mechanically with a brush or scraper or by an electrical arrangement, which eliminates all moving parts.

Separation Results

The separator has been used for concentration of magnetites as well as iron powder. Table I shows some results of laboratory test.

It is apparent from the separation of the two Adirondack magnetites that is possible to produce extremely pure super-concentrates from normal New York State magnetite concentrates. So far as we know, it has never been shown before that such high grades of concentrates could be produced from these raw materials. The concentrates, which normally are produced below -10 mesh, were ground to -42 mesh before separation. The SiO_2 content was brought down to 0.2 to 0.3%, which makes the magnetite concentrates pure enough

(*Continued on page 118*)



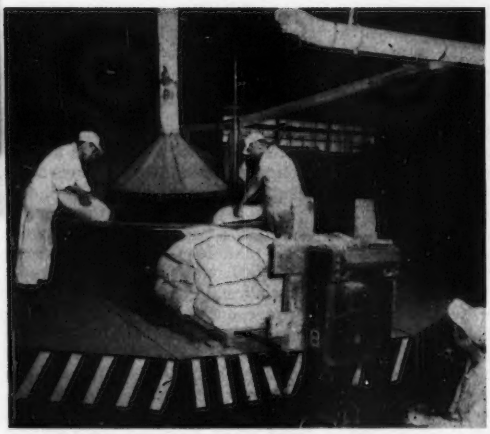
RFC's LONE STAR TIN SMELTER at Texas City, Texas, plays an important role as the plant best able to handle low grade ores from South America. Even if cut off from the Far East, the plant could maintain capacity on Bolivian ores.

Strategic Tin Production Is

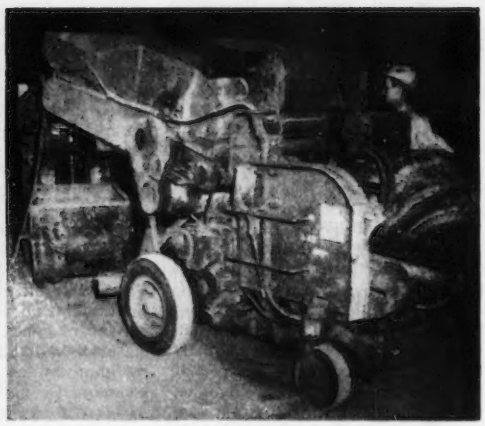
RUNNING A TIN SMELTER treating lower-grade ore than can be handled anywhere else in the world is not a cut and dried proposition. Just ask the N. V. Billiton people who manage the RFC's tin smelter at Texas City. Fortunately they have a substantial backlog of experience in the Far East tin fields which has stood them in good stead in evolving their present practice from what they started with in the war years. (See *E&MJ*, June, 1943)

Location of the smelter, which at first glance may seem odd, is entirely logical. The plant was set up primarily to handle ore from Bolivia which was our only source during the war, and therefore plant availability to shipping was a prime factor. In addition it is handy to a source of cheap fuel, natural gas, and to the manufacturers of HCl, which Lone Star uses in large quantities.

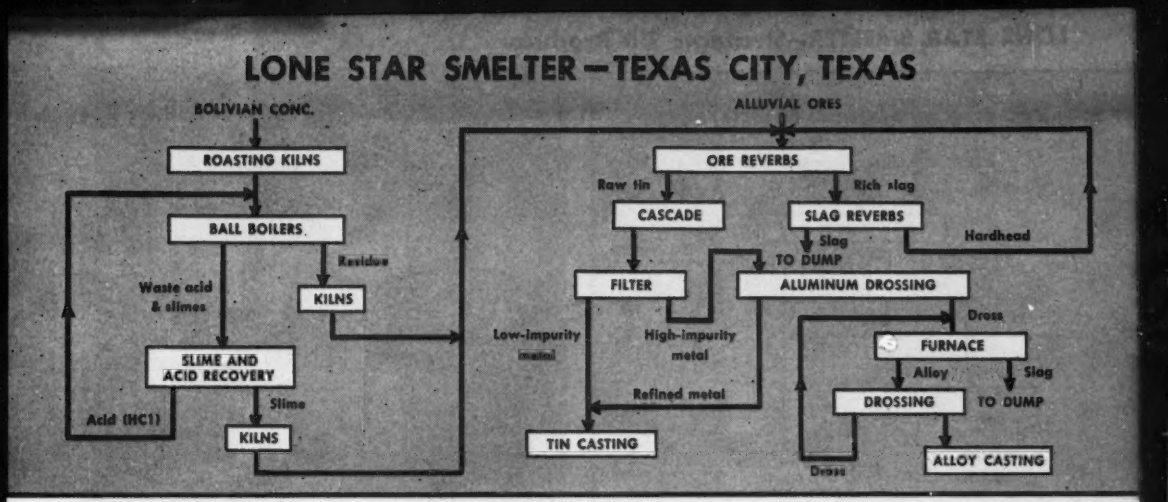
About ⅔ of the ore treated at Texas City today comes from Bolivia containing from 18% to 60% tin. The rest is alluvial ore from Indonesia, Siam, Belgian Congo and several other scattered points, which runs 70% to 75% tin. From this feed each month the smelter produces about 3,000 tons of 99.8% tin and a few hundred tons of a tin



1 ORE SHIPMENTS arrive in 100-lb. bags which are emptied by hand, crushed, paddle-mixed, and sampled. Bags are reused, then burned in kilns when worn out, thereby recovering a dust running 30% tin. For years, Bolivian ores, hardest to treat, have been handled here.



2 DIFFERENT ORE MIXES, graded by impurities contained (see text), are stored in different 1,000-cu. ft. bins. From various bins an Eimco loader reclaims the ore, filling enough 1-ton buckets, moved in the plant on trailers, in one shift to keep smelter going for a full 24 hr.



HANDLING IMPURITIES is the biggest headache at the smelter. Iron and other impurities are removed by leaching, by recycling various products (shown in flowsheet above), and by special treatment, including a liquid metal filter.

Up To The Lone Star Smelter

alloy, known as Copan (14% Sb and 4% Cu) for the Babbitt producers.

With a wide range in amount as well as kinds of impurities, smelting and refining almost inevitably take the form of a batch process. At the Lone Star, incoming ore is graded into several mixes. Along with the high-grade alluvial ore, Bolivian ores are grouped as follows:

A mix—low impurities
B mix—high impurities
C mix—high in sulphur, up to 20%.
F mix—high in tungsten

Treatment for each entails slight variations, but the outcome is a large number of equipment units on the flow sheet. For example there are ten kilns in the smelter divided to handle A mix, B mix, C mix, residue of preliminary treatment of A and C mixes alternately, and residue of B mix.

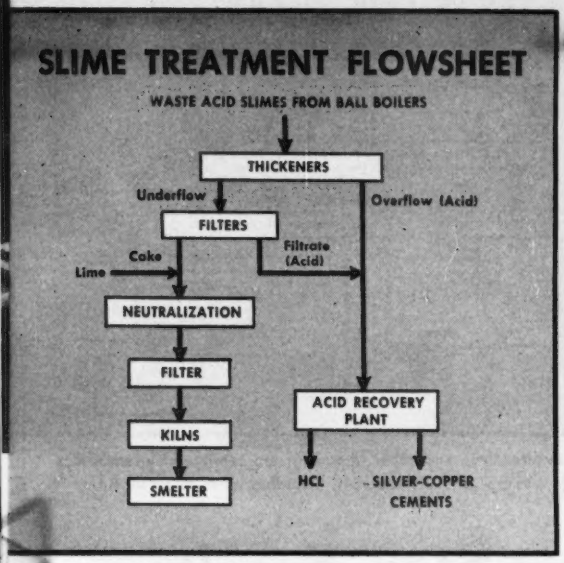
Biggest headache is the presence of iron which tends to combine with tin to form a refractory compound, aptly named "hardhead."

Bolivian ores are all subject to pre-treatment while alluvial ores are fed directly into the smelter. Here's a glimpse of the Lone Star Smelter.

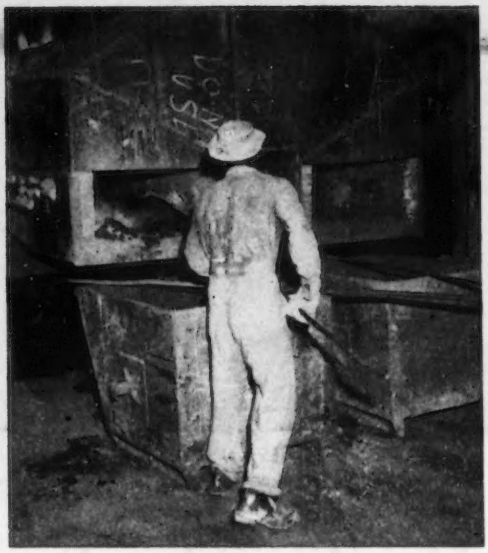
(*Continued on page 86*)

3 ROTARY KILNS used in roasting to remove sulphur, make other impurities more soluble, i.e. converting ferric to ferrous compounds. Added salt forms easily soluble chlorides. Hopper-fed kilns are 4 ft. in diameter, 45 ft. long, fired by natural gas, water-spray controlled.

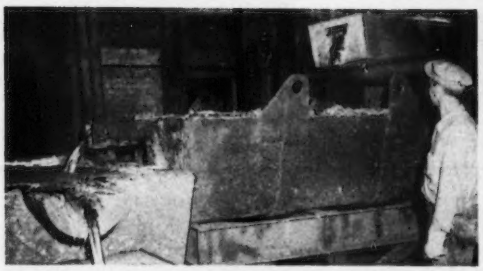
4 BALL BOILERS, used for HCl leaching, handle 8 to 16-ton batch of ore, depending on mix. Welded steel shell, lined with rubber and acid-proof brick, rotates at 1 rpm. Steam at 15 psi. can be injected. Leaching takes 12 to 16 hr. Residue is washed in water, dried, recalcined.



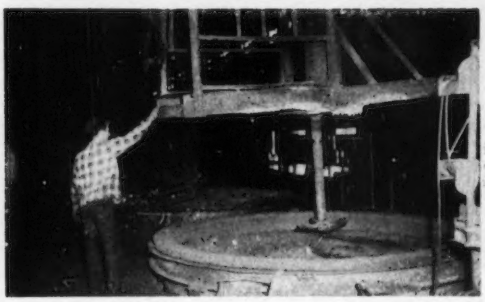
5 SIX THICKENERS, each 25 ft. square, remove slimes from spent acid. Overflow is almost pure acid. The slimes containing 15 to 20% hydrochloric acid, go to Oliver drum filters, where most of this acid is recovered. Cake from drums is pulped so that lime additions will neutralize it, enabling return to smelter.



6 NEUTRALIZED FILTER CAKE is put through disk filter to remove most of liquid. Cake drops into this plant-fabricated dryer before going to the kilns for reroasting. After reroasting, calcine is ready for smelter. Acid is recovered in special plant located near smelter then returned to ball boilers.



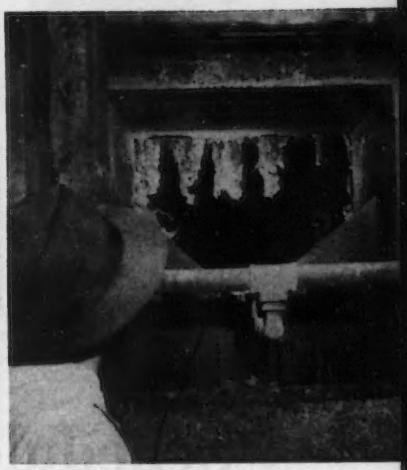
9 CASCADING TIN from reverb. permits air to oxidize a portion of iron compounds. It can then be skimmed.



10 CENTRIFUGAL PUMP handles liquid tin between various 50-ton kettles in refinery. Like other equipment, it can be lifted by overhead crane to any kettle.

11 FILTER receives molten metal after cascading. Filter medium consists of porous refractory plates, which allow pure tin to pass but hold back metal high in impurities. Metallic aluminum is added to impure metal, which is thereby cooled, the metallic impurities forming a dross. The entire mixture is run through a hydraulic press which squeezes out the still molten pure tin for casting. Dross is mixed with some of the rich slag from the ore reverb. and fed to a dross furnace, which produces a raw tin alloy and a discard slag. Just enough aluminum is added in this kettle to remove arsenic. This arsenic-containing dross is fed back to the dross furnace. The pure alloy, "Copan," makes Babbitt.

7 REVERBERATORY FURNACES, 40x12-ft., take high-grade alluvial ores in addition to Bolivian residues and slimes. Semi-bituminous Arkansas coal is the reducing agent, and limestone is used as flux. Raw tin produced goes directly to refining. Rich slag contains 25% tin as an oxide or silicate is granulated and fed to a slag reverb. Chief problem in the slag reverb., a double furnace made by joining two regular 40-ft. furnaces, is iron, which reduces with tin to form "hardhead." Formation of hardhead is limited by adding only enough coal to reduce only the tin. Hardhead is fed back into the ore reverb., the amount of circulating load depending on the quantity of slag-forming material in the ore. Dust is collected in 98.86% efficient Cottrells and fed back to the ore reverb. Slag discarded contains about 1½% tin. Best place to remove iron is in leaching operation with hydrochloric acid.



8 DOUBLE-BOTTOM FURNACE catches tin, which at high temperature, leaks through brickwork as these crystals did.

12 DROSSING TIN is slow job involving repeated treatment with air, steam, and aluminum until assays show tin is sufficiently pure. Longhorn tin from Lone Star smelter is among trade's purest. This is close-up of dross forming on pool as agitator stirs molten tin.

13 ROTATING SPOUT turns as molds move, avoids spillage in casting tin. Molds form 83-lb. ingots. Top is the last to solidify.

14 TIN INGOTS, coming off the casting conveyor, are picked up by a hydraulic lift and stacked on small trailers to be carried to the shipping department. Output is 3,000 tons of tin a month.

Ninety - four - per cent - plus availability of diesel-electric locomotives at Kennecott's Ruth Pit proves how. . . .

DAILY INSPECTION, plus weekly washing and steam cleaning, both done on night shift, avoid locomotive tie-ups. Men here check oil level and oil screens.

Scheduled Maintenance Keeps

UPKEEP OF THE LARGE diesel-electric locomotives used in open-pit work is of great importance, if production is to continue without interruption. To insure steady operation the engines must be kept in good repair. The system of preventive maintenance for such units that has been developed by Kennecott Copper Corp.'s Nevada Mines Division in their big pit at Ruth, Nev., is worthy of study. Conversion from steam haulage to diesel-electric haulage was only recently effected. The maintenance system that will be described is used in the remodeled engine house on Copper Yard Flat.

Conversion operations, involving careful test work followed by substitution of 13 diesel-electric locomotives for the 85-ton steam units formerly used, were completed early in 1950. The economies in operation and the improvement in conditions effected have fully justified the capital expenditure required.

The new equipment consists of seven 125-ton units and six 70-ton units. The former are each powered with a 1,500-hp. turbo-supercharged V-12 diesel engine coupled to a generator supplying electric current to four traction motors, one of which is geared to each of the four driving axles. Each of the 70-ton units is equipped with a 600-hp. turbo-charged 6-cylinder diesel engine and four traction motors suspended from the axles, driving through single-reduction, oil-lubricated gearing.

The over-all length of the large locomotives is 55½ ft. The tractive force delivered at 25% adhesion is 57,500 lb. These units are used to haul 8-car ore trains from the pit to the ore yards. The smaller locomotives serve for spotting cars at the shovels for the most part, and sometimes haul waste cars to the dumps.

Haulage of ore trains from the yards to the concentrator at McGill, about 23 mi. away, is done by four of the big locomotives, which are under ICC regulations. Total daily tonnages handled vary from 30,000 to 35,000, of which from 17,000 to 24,000 tons is ore.

Preventive Methods Used

Maintenance at the Copper Flat engine house is conducted on a preventive basis so far as practicable. The building has been changed in layout and in its equipment. Old smoke jacks have been removed and exhaust fans installed, as well as a drop table to facilitate truck changes and general wheel work. Overhead lifting units are available at strategic points to expedite work on locomotives taken out of service for general overhaul.

Maximum Work for Minimum Cost

The shop force that takes care of the locomotives has been organized by E. C. Lindskog, master mechanic, to hold operating costs to a minimum and turn out the maximum amount of work. Various groups have been assigned to specific duties, for which they are held responsible by one in charge, who in turn reports directly to the master mechanic.

Another aid is the keeping of simple and accurate records of such details as engine and motor troubles, locomotive failures, wheel, axle, and truck life, availability of each locomotive, hours of operation, miles traveled, tonnage hauled, cost of repair, and cost of locomotive upkeep per ton of ore produced.

Inspection on Graveyard

Routine inspection of locomotives is carried out on the graveyard shift, during which no haulage is done. The crew consists of a foreman, three mechanics and two helpers, and an operator to inspect air equipment.

When received at the engine house, each locomotive is examined as to lubricating oil, fuel, water, and electrical equipment such as batteries, motor windings, brushes, contacts, etc.; also wheels, axles, and motor-support bearings. In addition, crank case doors are opened to permit inspection of screens for metal. Air filters are changed every day, those dirty being washed and sprayed with oil during the day shift. Fuel and oil filters are changed monthly or sooner if necessary. The diesel engines are washed and cleaned weekly with the help of a steam cleaner unit to aid in detecting oil leaks, loose nuts, bolts, and other mechanical defects.

A complete truck assembly with traction motors is kept on hand for each of the two types of locomotives, as well as spare filters for

FAST REPAIR JOBS, when needed, are done on day shift. Here locomotive comes up to drop-table in engine house to change trucks, now an easy 6-hr. job.

AIR FILTERS get routine washing and oil-spraying every day.

Production High

oil, fuel, and air, fuel pumps, fuel injection nozzles, and other engine and motor auxiliaries. This permits cleaning, repair, and adjustment of the units removed during the night shift by crews that work on the day and afternoon shifts. Such crews generally consist of a mechanic and a helper.

Removal of the truck assembly for inspection and general overhaul by use of the mechanical drop table mentioned requires little more than three hours. The reinstallation takes about the same time. Dirty or spent oil drained from the engines is not reclaimed. The amount is too small to warrant installation of the special equipment required. Oil in the crank cases is checked every night with a stick or ruler. Any rise in the level usually means fuel dilution. Oil samples are taken each month for analysis.

Overhauled After 8,000 Hr.

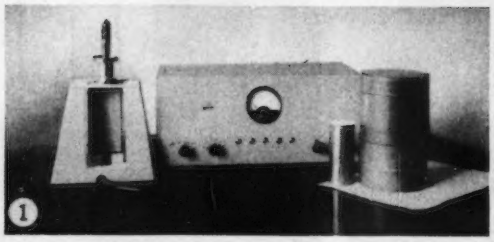
Since conversion, only one locomotive, the No. 101, has been given a general overhaul, and that after 8,237 working hours. The complete job, involving replacement of two cylinder liners, two pistons and all piston rings, main and connecting rod bearings, cleaning cylinder heads and refacing valve seats and grinding-in valves, etc., required 112 shop hours. The unit was released for full service on May 12, 1951. At the time of my visit, on June 26, it had clocked 350 working hours out of 496 hr. Main bearings generally are changed every six months.

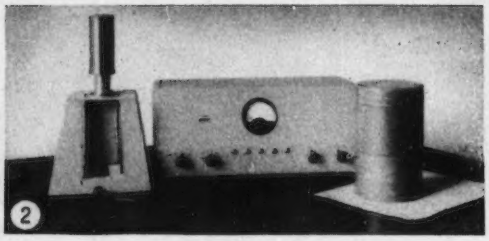
Total operating hours for each of the 13 locomotives in service is as follows: Of the large locomotives, No. 101 has 11,047 hr.; No. 102, 9,479 hr.; No. 103, 6,682 hr.; No. 104, 6,784 hr.; No. 105, 7,289 hr; No. 106, 6,375 hr.; and No. 107, 6,286 hr. Of the six 70-ton units, No. 61 has operated 5,900 hr.; No. 62, 5,951 hr.; No. 63, 5,168 hr.; No. 64, 6,389 hr.; No. 65. 6,386 hr.; and No. 66, 4,915 hr. It is the locomotives Nos. 103, 104, and 105, put in service respectively Dec. 29, 1949, Feb. 3, 1950, and Jan. 24, 1950, that haul ore between Copper Flat Yard and the McGill concentrator. This is done in 30-car trains averaging 3,000 tons, gross weight. Mileage accumulated by the three units is 62,374, 66,585, and 74,826, or a total of 203,785 miles. This gives an average mileage per month per loco. of 4,600 miles.

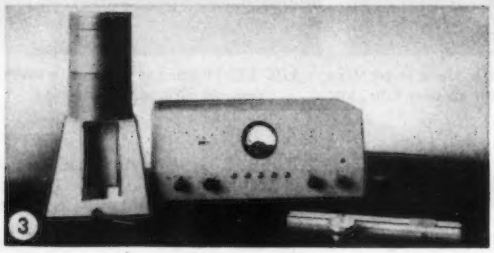
The type of maintenance described has held availability of the 13 locomotives to 94.09%, including overhaul of No. 101 unit. This is a most satisfactory record.

WHEEL FLANGES are checked in completing spare truck assembly.

FUEL INJECTION NOZZLES are reconditioned regularly (above left) and are tested by special equipment (above right) before returning to locomotives.







EQUIPMENT USED is assembled in successive steps, shown here beginning at upper left. In picture No. 1, left to right, is seen the counter tube projecting from lower part of sample holder mounted between four wooden feet, the Geiger-Müller counter, the cylindrical brass sample holder, and, next to it, the lead chamber.

A quick method for determining potassium solids accurately

Potash Content by Geiger Counter

HANS FRIEDMANN
Skanska Cement A. B.
Köping, Sweden

METHODS ALREADY DESCRIBED[1] for determining potassium by its natural radioactivity by use of a Geiger-Müller counter have been successfully applied in the cement plant of Skanska Cement A.B. at Köping, Sweden. A new method has been developed to speed up the many potassium determinations required. Recovery of flue dust containing about 80-90% K_2SO_4 as a byproduct from the rotary kilns makes it necessary to analyze the slurry, clinker and dust regularly. The analysis can now be made in 1 to 3 hours, as compared with 1 to 2 working days previously required.

To prepare a sample, only drying and pulverizing is required. Potash dust from electric precipitators can be analyzed without previous preparation, so that continuous quality control can be maintained.

Apparatus

We are using a Philips Geiger-Müller counter Type 39,990 with a tube-type 18,501 for β-radiation. Like Gaudin and Pannell, we use a brass sample holder 42 mm. in diameter with a bottom plate that has an opening into which a plastic-film tube 18 mm. in diameter is cemented (Fig. 1). The volume of this cell is about 115 c.c. It fits the counter tube closely without touching it and is longer than the cathode. The sample holder is supported by a lower part, out of which the counter tube emerges, so that the sample forms a cylindrical jacket 12 mm. thick and 75 mm. high around the counter tube. This lower part takes the place of the original protective device screwed to the housing of the quenching unit of the counter apparatus. This unit stands between four wooden feet that support the lead chamber. The walls of the lead chamber are 35 mm. thick and reduce the background count from 20 to 7 per minute. This equipment is shown in the three pictures.

Making a Determination

The sample holder is filled with the pulverized sample up to the upper rim, taking care that there are no lumps or empty spaces, and the holder is inserted into the counter tube assembly. It is not necessary to weigh the sample nor is the density of the powder of importance, since the minimum density of 0.5 g/cm² is easily reached at the thickness of 12 mm. with our materials. Only for dust analysis it is recommended to crush possible lumps and press slightly the powder to get homogeneity. When the lead cylinder is placed around the sample holder, care should be taken that it fits concentrically and does not come in contact with the cell. Now the counter is switched on and the starting time is registered. A reading of the count is made after 30 to 60 minutes for potash dust with about 40% K_2O, after 2 to 3 hours for clinker or dried slurry, and the potassium percentage determined from the diagram. During this time the apparatus needs no attention whatsoever.

The testing times mentioned might without difficulty be reduced to a fraction if a more sensitive Geiger counter is used.

Calibrating

To examine the counter's usefulness and to work out the calibration curve, a series of chemically pure potassium salts ("pro analysi" or "analytical reagent") were tried. The results of these determinations can be seen in Table 1 and Fig. 2. The counts per minute are considerably lower than those of Gaudin and Pannell, but the precision is sufficient. This curve could be used for potash dust analyses. In the range of low potassium percentages (0-2%) present in clinker and slurry no checks could be made with pure compounds, because evidently our materials in Köping contain traces of at least one more radio-

[1]Barnes and Salley, *Ind. Eng. Chem.*, Anal. Ed., 15, 4, (1943); Gaudin and Pannell, *Anal. Chem.* 20, 1154 (1948).

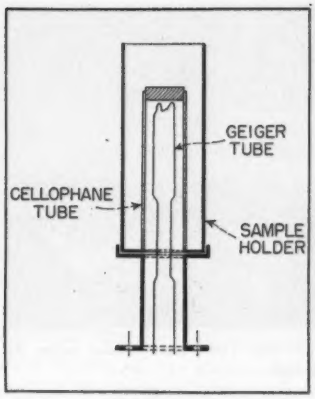


Fig. 1. GEIGER COUNTER TUBE projecting upward from its base, with sample holder and cellophane tube surrounding it.

Table 1. Data Obtained for Calibration by Testing Series of Chemically Pure Potassium Salts

Potassium salt	% K_2O theor.	% K_2O gravim.	Count/min.	Inclination of the curve = count − 7.0 / % K_2O	Error[1] % K_2O	% of result
Sand	0		7.0			
K_2SO_4; sand	1.1		9.6	2.36	0	0
K_2SO_4; sand	9.0		27.8	2.31	−0.3	3
K_2SO_4; sand	18.0		48.9	2.32	−0.4	2
$KMnO_4$	29.8		76.8	2.34	−0.5	1.7
$K_2Cr_2O_7$	32.0		84.0	2.40	+0.4	1.3
KNO_3	46.5		116.0	2.34	−0.7	1.5
K_2SO_4	54.1		136.3	2.39	+0.2	0.4
KCl	63.2		159.0	2.40	+0.7	1.1
Potash dust 1		38.8	98.7	2.38	−0.3	0.8
Potash dust 2		33.9	92.3	2.38	+1.9	5.6
Potash dust 3		39.3	100.9	2.38	+0.1	0.0
Potash dust 4		35.1	92.8	2.38	+0.9	2.6
Potash dust 5		39.7	101.2	2.38	−0.1	0.0
Potash dust 6		40.3	104.4	2.38	+0.6	1.5

[1] By "error" is meant the deviation from the average curve.

Table 2. Deviations From Analytical Valve

Sample	Number of Samples	Range % K_2O	Mean Error % K_2O	Number of samples with an error of: ±0.3%	±0.2%	±0.1%	±0.0%
Clinker	43	0.4–1.0	±0.1	0	10	20	13
Slurry	52	0.9–1.8	±0.1	1	7	25	19

active substance, probably uranium. Yet even in these cases the agreement with the gravimetrical analyses and the reproducibility were good.

In the case of slurry and clinker (Fig. 3), all the readings are located above the curve for the pure substances as transferred from Fig. 2. This difference is constant for slurry and smaller than for clinker, where it increases with increasing potassium content. The explanation is evidently that both more potassium and more of the other radioactive substance is evaporated with harder burning. The difference is smaller for slurry, in part because of the lower relative uranium content due to the carbon dioxide. It is to be expected that this radioactive background is variable when the raw materials change, but during the past eight months when the method has been used, no such variation has been observed in any of our tests.

Precision Obtained

By use of a great number of clinker and slurry samples, a series of points has been determined on a graph by plotting the analytical results on the horizontal axis and the counts per minute on the vertical axis. The curve of average thus obtained was used to determine the potassium content by the counter reading. Now the potash content was calculated for all the analyzed samples on the basis of this curve and compared with the analyses. The deviations from the actual analytical values are given in Table 2.

The average error of ± 0.1% K_2O corresponds to about 10-25% of the measured value for clinker, 5-10% for slurry; that is, it is of the same magnitude as the errors of the platinum chloride method we had been using.

(*Continued on page* 119)

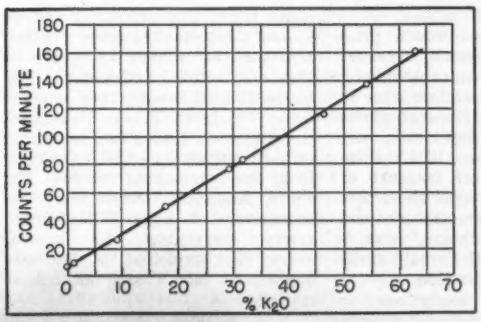


Fig. 2. CALIBRATION CURVE worked out, to test counter's usefulnes, by determining counts for series of chemically pure potassium salts. Data are given in Table 1.

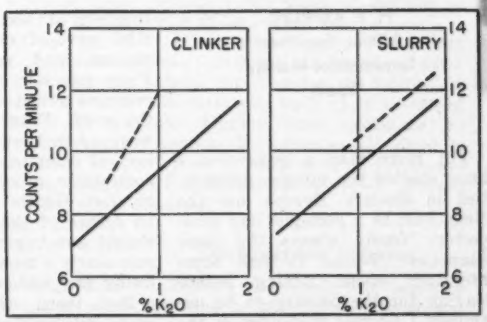


Fig. 3. SLURRY AND CLINKER determinations are plotted above calibration curve determined from pure substances. See Fig. 2.

ELEVEN WELL-MINERALIZED VEINS traverse the area in view here, as indicated approximately by the lines drawn across the landscape. These parts under valley fill have never been touched.

NEW MUTUAL INTEREST between the U.S. and Spain suggests that it is worth taking another look at the feasibility of American participation in the development of Spanish minerals.

Important idle mineral wealth is generally recognized to exist in Spain, but for political, legal, or commercial reasons, American capital has regarded the "climate" as unpromising for mineral investment.

Here, however, an experienced mining engineer who has successfully entered Spanish mining suggests a practicable method of mutually beneficial cooperation—technical assistance and equipment loans, repayable in materials.

MOST OF THE TREASURE which built these long-abandoned surface structures and dumps is still in the ground.

Forgotten Country—Frozen Mines

H. E. KEPPLER
Mining Engineer
Torremolinos-Malaga
Spain

For more than a generation I have studied the mining possibilities in Eastern Europe and the Near East as a geologist and prospector. Nearly always the same happened: Trying to find some literature about mining before leaving for the country to be examined I learned that even in the state library nothing helpful existed. But on arrival at the first hotel and registering as a mining engineer, I was inundated by a tidal wave of mine owners, prospectors, and various "experts." From minister down to shepherd, everyone owned the richest mine in the world. From a piece of pyrite wrapped in tissue paper to a carload of samples, they laid the incontestable proofs of treasure at my feet. Within a week there was no corner of the country where I should not buy a "mine," and it was nearly a must if I would avoid losing face and reputation.

But there are exceptions to every rule, as I discovered when I got the order to go to Spain eight years ago. The first thing I did was to visit the state library of my home town. The official in charge looked a bit startled when I asked him for the mining literature of Don Quixote's fatherland. For hours without ceasing they brought books which would take three lifetimes to read. Like a fata morgana, long-forgotten names emerged from the long-buried records: Rio Tinto, Almaden, Linares, etc. The barometer of hope fell deeper; surely everything was known, every vein exploited to the last ounce! At last I saw an official statistic:

Lead Production, 1910 ..280,000 tons
Lead Production, 1942 .. 40,000 tons

The picture seemed to be clear.

RICH DUMPS like the above, carrying from 2 to 4% lead, abound in Spain awaiting the renewal of mining industry interests.

Mining in Spain was dying, and I would be just in time to see the funeral. Before leaving, however, I asked some competent people who knew the world about this country. "Spain? Well, very interesting. Was there about 28 years ago. Magnificent sphalerite. New developments? No, heard nothing since World War I." The general attitude was "forgotten country."

Nobody knew why.

Frozen Mines

During the trip to Madrid somehow I must have lost the magnetic power which always had pulled mine owners to me. Nobody cared about a mining engineer, and in conversation the answer was always the same. Mining was interesting ages ago; today too much risk; a long-term business; more profits in other directions. I was greeted in world-famous Linares with the question if I wanted to buy used machinery and the announcement that the last machine was sold half a year ago.

It would have been enough for an easily discouraged man to turn about and go home. But I wanted to get to the bottom. I stayed and learned the unbelievable truth. Here it is:

In a once world-famous district in which for 2,000 years some 400 mines were worked on about 80 veins of 10 miles' strike, an investigation showed the following result:

Of these 400 mines only 20 are still in production. Only three of these have important histories. About 100 mines are exploited to a depth of 1,800 ft. All others were stopped in the years 1906 to 1914, worked to a depth of only 400 to 600 ft. The reasons for the shutdown were the same for every mine:

(1) The low lead price of 6 to 8 pounds Sterling per ton at that time,

(2) Unwatering difficulties for steam pumps (40 cu. ft./min.),

(3) Lack of money.

Encouraged by these investigations I personally took a lease of 99 years on two idle mines, arbitrary picked out. Each had two shafts which were in good condition and needed only unwatering. Within three months I had them dry and in repair. After one year of operation the production was 60 tons of concentrates per month with 82% lead and 7 oz. silver, ore reserves for many years. All that was accomplished with very little machinery.

In another district I heard that an enterprising physician started a mine with a complex lead-zinc-pyrite ore. Talking with him I heard the following story:

Twenty years ago a powder company worked the mine for pyrite, but it became difficult because it showed an increasing "contamination" by lead and zinc! I saw the truth of this story with my own eyes. Average thickness of the ore bed was 60 to 90 ft., yearly average of mill feed assays: 3.2% lead, 9.5% zinc, the rest pyrite. Length in strike about 4 miles, width known until now, about 2 miles. The entire district was never investigated by drilling.

Another case: In a huge eruptive mass, about 10 mines were worked for centuries to depth of 1,800 ft. are completely exploited, but the zones between the veins are thoroughly mineralized and untouched. Length in strike 4,200 ft., width 1,200 ft. Average samples taken by myself from various levels showed 3.5 to 5.0% lead. Estimated ore reserves at least 50 million tons, two-thirds of which could be worked by open-pit mining.

Countless cases like these could be told. They sound quite improbable, but they are the absolute truth.

The reasons for this incredible situation are always and everywhere the same:

The low metal prices after 1907 forced nearly all enterprises to shut their mines down. World War I created political difficulties and these caused financial calamities. Foreign investments ceased, domestic capital decreased. In 1931 the monarchy was overthrown and the revolution of 1936 broke out, and within the year 1945 Spain was completely isolated — politically, financially, and economically.

It was a mild evening in December when I was standing at the ruins of a once famous lead smelter. In front of me was the wide sea, behind were lifeless head-frames, cold stacks and the remains of a once noisy mill. I knew that 45 miles to the east the same dead relics of hundreds of mines wait for a new day to come, that the same distance to the west, 60 old lead-silver mines still hold most of their treasure. In the blue water of the Mediterranean three ships plowed their way to European harbors. The first took American mining equipment to Yugoslavia, still half behind the Iron Curtain, and continuously threatened by Moscow. The second brought Australian zinc to England, and the third, American lead to France. All three of them traveled thousands of miles to pass the Spanish coast within a few miles of millions of tons of untouched ore.

I have seen Trepca when it still was a deserted and forgotten mine. Under my direction the "Pirin" in Bulgaria was built up to be one of the biggest lead producers in Europe. Therefore an old timer is forced to ask: must it be true— "Forgotten country — Frozen mines?"

Development Needed

Nobody can study the resource position of the United States and its ever-growing consumer demands without concluding that the country's best advantage would be served by depending less heavily on its own resources and more on the

outside. By such a policy the U.S. would avoid a future have-not status or a condition of being at a competitive disadvantage with respect to nations possessing more cheaply exploited resources. It would also provide a better market for its surplus industrial output, and contribute toward a better balance of world trade.

Spain, on the other hand, has a wealth of mineral resources, and a great need for the goods the U.S. produces. The natural mutual advantage of trade with Spain is perfectly obvious.

On the manpower side the U.S. also has a problem. In a national emergency we can foresee a drain on the nation's manpower that will become the principal limiting factor to the magnitude of a national war effort. Spain, on the other hand, has competent, willing workmen. Why not utilize their contribution to the joint effort of the free world?

Some may have fears of burdensome surpluses visiting hardship on the U.S. mining industry. My own belief is that there should be no fears of mineral surpluses. The real problem of the free world is to continue to supply the raw materials to fill its growing requirements, whether military or otherwise.

A further advantage of undertaking development in Spain is that Spanish resources are known and readily accessible. No lengthy, dubious period of exploration is necessary.

In short, all factors point to the mutual advantage of U.S. participation in the development of Spanish mineral productions.

It Can Be Done

Because of actual experience in Spain, during which I have put an operation successfully into production, I am in a position to state what can and cannot be done successfully.

The simplest way would be to examine the mines in question and in case of favorable results, to buy at least a majority interest in the Spanish property. This is not possible, because the Spanish law prohibits a foreign majority in Spanish companies. Moreover, such a course is inadvisable for other reasons.

To transact successful business in a foreign country it is indispensable to understand the mentality of the people. The predominant feeling of every individual Spaniard as well as that of the entire nation is independence. The goal and dream of every Spaniard is to buy land, to be "dueño" of his property. Looking into history of all European countries, you will perceive that during the last 500 years all of them suffered foreign occupations many times during all the incessant European wars. The only exception is Spain. Since the Moors were expelled 500 years ago, only twice has the country been invaded. The first time was by Napoleon, who suffered there his first defeat after hundreds of victories in many other countries. The second invader was the international communism, only 15 years ago. With Greece and Korea it represents the only situations where communist use of force failed. In both cases this small and unprepared nation succeeded in resisting where some of the strongest and best prepared countries gave way. The power behind such a resistance was and is the fanatical determination of the entire nation to be independent.

Spain is a relatively poor country, more than half of her area being barren mountains. Only the Spanish farmers' unflagging diligence enables the country to feed its constantly increasing population. In such a country mineral deposits are usually regarded as national treasure, with little concern being shown for the desirability of immediate exploitation.

Spanish Independence

Always and everywhere it is more erroneous—and much more dangerous to neglect feelings than facts. Therefore it is unrealistic to assume that the Spaniards would consent to foreign control of their mineral resources.

But for the purpose of a production increase for a specific purpose —rearmament—the acquisition of mines is not necessary.

It would be more advisable to choose a way like the Caltex Oil Company of New York did, when it participated in the oil refinery of Cartagena, Spain, especially because this way got the immediate blessing of the Spanish Government. Caltex granted the Spanish company a loan of $8,000,000 partly as capital, partly in machinery, and got for this loan a long-term crude oil delivery contract. Ninety-five per cent of this mixed company is owned by a Spanish Government company. Therefore the loan becomes in a sense an obligation of the Spanish Government. The conditions of Caltex are: 9.39% interest on the loan; 12.5% toward amortization on the loan, but payable yearly in U.S. currency, so that the entire loan will be repaid after eight years.

The Caltex has for 15 years the privilege of supplying 50% of the total crude oil requirements. The crude oil delivery contract lasts nearly twice as long as the amortization period, according to published information.

Production Advances

Along such lines, a recommended course of action would be for an American company, after suitable engineering scouting, to advance the funds and provide technical assistance to bring productive capacity to an agreed level, as a loan, secured by a lien on the equipment purchased. Amortization and interest payments would be effected in materials out of a suitable fraction of production and the American company could expect to negotiate an option to purchase the major portion of the output for at least twice the period of amortization. If such an arrangement should present management difficulties, a trusteeship could be set up to have directive power and possibly to hold an additional lien on the real property.

In districts with a number of small owners, it would be feasible not only to make such advances against production, but the American participant could own and operate a custom treatment plant in conjunction.

From many conversations with Spanish authorities, mining engineers, and mine owners I know that a large majority of them would welcome such American assistance.

I am neither American nor Spaniard, but in spite of that, not at all neutral in my feelings. I admire the American way of living in freedom, the technical accomplishment, the public spirit, and the sense of humor. On the other hand I love the modest, but nevertheless proud Spanish workman and peasant. His sense of tact and decency, combined with a warm and real heartiness makes life in Spain easy and pleasant.

The results of thirty years of hard work vanished behind the Iron Curtain. However, I would feel compensated for this loss if I could help to lay the cornerstone for a successful cooperation between hard-working American and Spanish miners.

Ten-Minute Zinc Assay Checks On Mill Tests

FRANK H. MYLREA,
Assistant Geologist,
Reeves MacDonald Mines, Ltd.,
Remac, B.C.

DURING A BRIEF PERIOD of difficulty with zinc recovery at the Reeves MacDonald mill, we tried out a rapid assay method for zinc, and found it useful in checking concentrates and tailings before and after changes in flotation conditions.

This method, which can be run in ten minutes on prepared samples, is based on the dithizone test commonly used in trace analysis of metals in geochemistry.[1] Accuracy is ±10%. Thus, tailing running about 1% zinc can be assayed within ±0.1%. The method is rapidly gaining favor through its use in geochemical prospecting.

Zinc is liberated from the sample by evaporation with concentrated nitric acid. Dilute hydrochloric is added to take the residue into solution. The sample solution is then diluted in two steps to bring the zinc concentration down to a range suitable for handling with the dithizone test.

Color Comparison

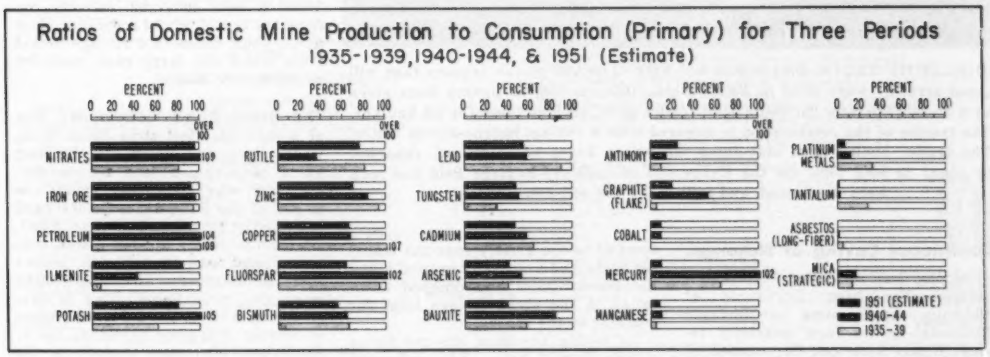
The test is colorimetric. The green organic dye, dithizone (diphenylthiocarbazone) reacts with zinc to give pink zinc dithizonate. Dithizone in excess gives, with the dithizonate, a color between green and pink.

Standard solutions are made up to give a suitable range of zinc content. Addition of dithizone in carbon tetrachloride solution produces a range of colors between green and pink, i.e. greenish-blue, blue, purple, and red-violet. Zinc content of an unknown is estimated by comparing it with the color series of the standards.

Use of sodium thiosulphate prevents interference from metals such as lead and copper within the required pH range of 4 to 5.5. The proper pH is maintained by acetate buffer. Iron interference is avoided by adding ammonium citrate to the sample solution. Weaknesses in the method are danger of pollution and of error caused by high dilution.

Although the dithizone test can not, of course, compare in accuracy with standard assay methods, we have found it to provide a useful tool where simplicity and speed are essential.

[1] Sandell, E. B. "Colorimetric Determination of Traces of Metals." Interscience Publishers, Inc., New York, 1950.



Self-Sufficiency of United States in Economic Minerals Decreasing

A SURVEY MADE by the U. S. Bureau of Mines reveals that in six years since the war, the ratio of domestic mine production to consumption of primary material for 38 important economic minerals has been decreasing. Estimates for 1951, compared with figures for the 1940-44 period, show that the United States has a lower self-sufficiency in 25 commodities, including copper, lead, zinc, and iron ore; an improved position in only 7; and an unchanged situation in 6.

Comparing 1951 estimates with the prewar period of 1935-39, the Bureau reports a lowered self-sufficiency in 21 commodities, improving self-sufficiency in 12, and an unchanged situation in 5.

These estimates illustrate that, while World War II exacted a tremendous toll in mineral resources, the ever-expanding demands of the postwar years are claiming even greater amounts for both civilian and military consumption.

The data of the Bureau's survey have been used in making a chart[2] showing the ratio of the domestic mine production of each commodity to its consumption (primary) for three periods, namely: 1935 to 1939, 1940 to 1944, and the year 1951. For the last period the figures have been estimated.

[2] In reproducing this chart, we omit the individual bar charts for nine commodities where production is seen equaling consumption in each of the three periods. These are: sulphur, molybdenum, anthracite, phosphate rock, bitumens and lignite, salt, natural gas, helium and magnesium. The bar charts are also omitted for nickel, chromite, tin, quartz crystal, and industrial diamonds, because domestic production of the five has been and is wholly lacking save for a small output of chromite in the 1940-44 period. The bar charts for the remaining 24 mineral commodities are given.

KEEPING TAB ON PRACTICE

SIDE-DUMP TRUCK-TRAILERS ON THE MESABI. Seven reasons that will stand scrutiny were cited in *E&MJ* Sept., 1951, p. 106, as having been given by a Mesabi operator for using semi-trailer units, such as these for pit haulage. The tractor of the combination is powered with a 300-hp. butane-driven motor. The trailer bodies have side-dump, drop-door boxes of 16-cu. yd. capacity, or about 30 long tons. On the Range the off-highway-haulage field has long been dominated, and still is, by the end-dump truck.

Continuous Caving at Nchanga. A caving method called "continuous caving" has been introduced at Nchanga copper mine in Northern Rhodesia. In its June quarterly review, Anglo American Corporation of South Africa describes the method as used in a typical caving layout on its Nchanga West, or lower orebody. The sub-haulageways, scraper and grizzly drifts, and other development openings are correctly positioned under the footwall with the aid of diamond drilling from the sub-haulage faces during their advancement.

This development is usually in arkose and granite, which do not normally require support. Panel drives and undercut raises are used to develop the ore at its base; when development is completed, ore flow is induced by progressively blasting the undercut after diamond-drilling it with 60-ft. diamond-drill holes. As the broken ore from the undercut is drawn through the finger raises, the weight of the rocks above on the unsupported ore causes it to collapse and it is drawn by gravity through the fingers into the scraper raises. It is then scraped to the grizzly over the transfer chute and eventually carried along the sub-haulages and dumped down raises to the main haulage level for transfer to the shaft.

As caving advances, the ore forms a "cantilever" beam. The sediments are strong under compression and shear, but relatively weak under tension; the result is that induced forces cause the ore to break along the principal tension planes while, at the same time, it ruptures along its natural planes of weakness. By regulating the draw and advance of the completed undercut, a cave cantilever angle of about 25 deg. is maintained, at which the best breaking of the ore from the solid is obtained. Large masses of ore break away and further comminution takes place as the pieces grind against one another in the downward passage.

The rate of draw has to be closely controlled to secure maximum breakage with minimum dilution from the capping. The draw angle is maintained at between 15 and 20 deg.

Continuous caving differs from ordinary block-caving in that a block approximately 175 ft. on the dip is undercut in the center of the orebody and two caving faces are formed and continuously undercut, retreating east and west to the ends of the ore body. As the cave advances, a further area down dip is undercut, and the area being caved forms a rough "V" or "U" shape, progressing down dip with its lowest, or apical point near the central axis of the cave area. In ordinary caving, blocks of ore are separately developed, undercut, and caved, the actual cave being initiated in each separate block.

The initial cost of establishing the extraction workings in the method described is heavy, but when large tonnages are handled, the overall cost is cheap.

Winter Stockpiling by Conveyor. At Cleveland-Cliffs Iron Co.'s Mather "B" shaft on the Marquette Range, stockpiling will be done with conveyor belts carried on tubular-column-supported steel trestles and housed in heated galleries. It is anticipated that this scheme will prove very efficient. The installation is the only one of its kind in the Lake Superior Iron Country. A belt installation of a very different sort is seen at Pickands Mather's Cary shaft at Hurley, Wis. on the Gogebic Range. Here a belt conveyor delivers ore from the crushing and screening plant at the shaft house to a storage pocket from which the larry cars, used for stocking, are loaded.

The Steel Band Conveyor. Use of a stainless steel strip 36 in. wide, 1/32-in. thick and up to 600 ft. long as a shaking-pan line for conveying coal was mentioned briefly on p. 107 of the July, 1951, *E&MJ* (and described at length in *Coal Age*, April, 1951). Now comes word of a steel conveyor band used in a 10-deg. incline shaft in Germany, at the Barbecke iron mine near Peine. This is described on p.16 of the July, 1951 issue of *Mining Magazine* (London) by A. E. Lance, who says that it is the only such band used in Germany for the purpose. The band is made by Dinslaken Eisenverke A. G. and its mountings by Demag A. G., at Duisberg. It is 1,575 ft. long and 25.6 in. wide. Thickness of the metal ranges from 0.8 mm. to 1 mm. Rated capacity is 100 tons per hour. Mounted on specially designed spring rollers, the band is driven by a 75-kw. motor, located at the top of the shaft.

Claim is made that one such band with one motor replaces two rubber belt-conveyors and two motors; also that the steel band costs one-fifth as much as the belting, although the former has a life of 18 months to two years against as much as five years for the rubber belt. The cost of maintaining the steel band is also said to be less.

Conveyors of this type are better known to European mining than to the industry in the United States.

MARKETS—Trends and Prices (*Continued from page 69*)

United States and Foreign Copper Statistics

The latest domestic and foreign copper statistics of Copper Institute are summarized as follows, in short tons:

UNITED STATES

Production:	July	August	Jan.-August 1950	Jan.-August 1951
Crude, primary	(a) 77,299	68,731	610,184	644,251
Crude, secondary	(a) 5,278	5,246	89,037	46,543
Totals	82,577	73,977	699,221	690,794
Refined	93,258	79,613	837,546	819,136
Deliveries, refined	101,095	105,063	897,150	877,524
Stock at end, refined	(b) 68,045	(b) 70,812	50,952	(b) 70,812

OUTSIDE UNITED STATES

Production:	July	August	Jan.-August 1950	Jan.-August 1951
Crude, primary	(a) 115,255	113,147	893,621	910,440
Crude, secondary	778	852	10,241	3,321
Totals	116,033	113,999	903,862	913,761
Refined	(a) 104,599	105,907	729,428	795,738
Deliveries, refined	(a) 82,251	83,607	576,295	648,247
Stock at end, refined	(a) 159,472	161,269	157,541	161,269

(a) Corrected figures. (b) Includes tonnages delivered to U.S. consumers at foreign ports.

Official London Prices

Consumers in the United Kingdom obtain copper, lead and zinc at prices named by the British Ministry of Metals. Delivered prices in effect as September ended were as follows:

	Per Long Ton £	s.	d.
COPPER: (a)			
Electrolytic, high conductivity	227	0	0
Fire refined, high conductivity	227	0	0
Fire refined, high grade	226	10	0
Fire refined, min. 99.7 percent	226	0	0
Fire refined, min. 99.2 percent	225	10	0
LEAD:			
Soft, foreign duty paid	180	0	0
Soft, Empire	180	0	0
English, refined	181	10	0
ZINC:			
Foreign (G.o.b.) duty paid	190	0	0
Domestic (G.o.b.) duty paid	190	0	0
Prime Western and debased	190	0	0
Refined and electrolytic	194	0	0
Minimum 99.99 percent	196	0	0

(a) Effective Sept. 13.

Miscellaneous Metals, Ores, Minerals

Quotations cover wholesale lots, prompt shipment, f.o.b. New York unless otherwise stated

MISCELLANEOUS METALS

September 29, 1951

Aluminum, ingot, 99 plus percent, lb. (base price)	19c.
Antimony, spot, lb., 5 tons and up but less than carload in cases	45.350
Bismuth, ton lots, lb.	$2.25
Cadmium, commercial sticks, delivered, lb.	$2.55
Calcium, lb., ton lots, 98 percent, cast	$2.05
Chromium, 97 percent grade, lb., contract	$1.07
Cobalt, 97 to 99 percent, per lb.	(b) $2.40
Indium, troy oz.	$2.25
Nickel, cathodes, lb., f.o.b. Port Colborne (a)	56½c.
Magnesium, 99.8 percent, carloads, lb., producer's plant, Freeport, Texas	24½c.
Palladium, troy oz.	$24.00
Platinum (Official quotation wholesale lots) troy oz.	$90.00
Quicksilver, flask of 76 lbs., 25 flasks or more	$215 @ $200
Selenium, 99.5 percent, lb.	$3.00 @ $3.50
Silicon, minimum 97 percent, carloads, lb	20c.
Tellurium, lb.	$1.75
Thallium, 100 lb. or more, lb.	$12.50
Titanium, 96 to 98 percent, lb.	$5.00

(a) Includes U. S. duty. (b) Effective Oct. 1, 1951.

METALLIC ORES

Beryllium Ore, imported, 10 to 12% BeO, per unit	$33.00 @ $36.50
Chrome Ore, per long ton, f.o.b. cars Atl. ports, dry	
44% Cr_2O_3, no ratio	$27.00 @ $28.00
48% Cr_2O_3, 3 to 1 ratio	$43.00 @ $53.00
Iron Ore, Lake Superior, Lower Lake ports, long ton:	
Old Range bessemer	$8.70
Mesabi bessemer	$8.45
Mesabi, non-bessemer	$8.30
Lead (Galena), 80 percent, Joplin, Mo., ton	$218.42
Manganese Ore—Per long ton unit of Mn basis 48 percent manganese, nearby positions, subject to premiums and penalties, $1.25 @ $1.30, c.i.f. U. S. ports, duty extra. Long-term contract quotations wholly nominal and matter for negotiation.	
Molybdenum Ore, 90%, per lb. of MoS_2 f.o.b. mines	60c.
Tantalite, 60% concentrate, per lb.	$2.00 @ $2.50
Tungsten Ore, per unit of WO_3	
Foreign, 60 percent, U. S. equivalent, duty extra	(a) $65.00
Domestic, scheelite, 60 percent f.o.b. mine	$65.00
Vanadium Ore, per lb. of contained V_2O_5 f.o.b. mines	31c.
Zinc Ore, Prime, 60 percent concentrate, Joplin, Mo., per ton	$115.00

(a) F. o. b. port of shipment.

METALLIC COMPOUNDS

Arsenious Oxide (arsenic trioxide) lb., in bbl. carload lots delivered	6½c.
Cobalt Oxide, 72%, metallurgical grade, per lb. of Co	$2.25
Copper Sulphate, 100 lb.	$8.95 @ $9.95

ALLOYS

Beryllium Copper, 4 percent Be, per lb. of alloy, 5 lb. ingot	$1.56
Ferrochrome, 65 to 69 percent, per lb. of Cr contained	21⅜c.
Ferromanganese, 78 to 82 percent, gross ton, seaboard	$185.00
Ferromolybdenum, 55 to 65 percent Mo. lb. of Mo. contained	$1.32
Ferrosilicon, 50 percent, per lb. of contained Si	12.4c.
Ferrotungsten, 75 to 80 percent, lb. of W contained	$5.00
Ferrovanadium, per lb. of V delivered	$3.00 @ $3.25
Silicomanganese, max. 1½ percent carbon, per lb. contracts	9.9c.
Spiegeleisen, per long ton, 19 @ 21 percent grade	$75.00

NON-METALLIC MINERALS

Asbestos, f.o.b. Canada (Quebec) mines (U. S. funds), ton:	
Crude No. 1	$960 @ $1,500
Crude No. 2	$595 @ $900
Spinning fibers	$275 @ $475
Shingle fibers	$123 @ $170
Paper stock	$85 @ $119
Waste	$63 @ $70
Shorts	$30 @ $63
Asbestos, Vermont, f.o.b. Hyde Park:	
Spinning fibers	$279.50 @ $302.00
Shingle stock	$135.00 @ $162.00
Paper stock	$81.50 @ $115.00
Waste, stucco or plaster	$71.40
Refuse or shorts	$34.00 @ $63.00
Barytes, f.o.b. mines:	
Georgia, crude, per long ton	$13.00 @ $13.50
Missouri, 93 to 94 percent $BaSO_4$, per short ton	$10.15 @ $10.40
Bauxite, long ton, f.o.b. point of shipment:	
Domestic, crude, 50 to 52 percent (not dried)	(a) $4.50 @ $5.50
Domestic, chemical, 55 to 58 percent	(a) $8.50 @ $9.50
Domestic, abrasive, 80 to 84 percent	(a) $18.00 @ $18.50
China Clay, f.o.b. mines, ton:	
Georgia, filler and ceramic grades	$8.50 @ $9.50
North Carolina ceramic grade	$20.25 @ $22.25
Feldspar, bulk ton:	
Potash or soda feldspar, 200 mesh, ceramic grade	$18.50 @ $22.25
Glass feldspar, white, 20 mesh	$11.75 @ $12.50
Fluorspar, f.o.b. mines, bulk, Kentucky and Illinois, 70% effective, CaF_2, ton	$43.00
Acid 97% concentrate, bulk, ton	$50.00
Fuller's earth, f.o.b. Georgia or Florida, ton	$7.00 @ $14.00
Magnesite, per ton dead-burned, bulk, f.o.b. Washington	$36.30
Mica—Domestic, f.o.b. mines. Punch 12 to 22c. per lb. according to size and quality. Sheet, clear, 1½ x 2 inch, 80 to 85c.; 2 x 2 inch, $1.10 to $1.20; 2 x 3 inch, $1.50 @ $1.60; 3 x 3 inch, $1.80 @ $1.90; 3 x 4 inch, $2.20; 3 x 5 inch, $2.40; 4 x 6 inch, $3.15; 6 x 8 inch, $4.25. Wet ground, very fine, $140 @ $155 per ton. Bulk sales, dry ground: $32.50 @ $70.00 per ton. Scrap, $32 and up.	
Ocher, Georgia, ton, in sacks	$24.00
Pyrites, Spanish, per long ton unit of S, c.i.f. Atlantic ports	Not Quoted
Sulphur, Texas, mines, long ton	$22.00
Talc, f.o.b. works, ton:	
New York, purified	$18.50 @ $20.00
Vermont, extra white	$12.50
Tripoli, Missouri, ton:	
40 mesh, cream colored	$35.00

(a) Nominal.

IRON AND STEEL

Pig iron, gross ton, basic, Valley furnaces	$52.00
Steel, f.o.b., Pittsburgh billets, net ton	$56.00
Structural shapes, 100 lb.	$3.65

WASHINGTON IMPACT

Young Joins DMPA—Purchase Program Now Moving—Machinery Supply Jeopardized

JESS LARSON'S first two acts as administrator of Defense Materials Procurement Agency are symbolic of the problem which he faces.

First, he appointed Howard I. Young as deputy administrator.

Second, he surrendered many of the powers granted him. Larson expects this surrender to be temporary, but as long as it lasts, it highlights the wide difference between DMPA as now constituted and the "centralized authority" which President Truman said it would be.

Young is the top-grade mining man Larson needed as deputy. Young's appointment allowed Larson to take into the DMPA fold immediately the responsibility for recommending loans, purchase contracts, and quick tax amortization.

Larson's other powers were redelegated to the agencies previously possessing them. This includes the key job of estimating consumption and production of metals, which was left in DMA. The domestic exploration program was also left with DMA. General Services Administration retained its authority to negotiate contracts for the purchase of scarce materials.

Larson is pressing hard to get outstanding executives from the mining industry. His purpose is to round out his staff as rapidly as possible in order to centralize all the authority granted to him. The real question will then emerge: Is it sufficient to get the job done?

Foreign operations is an area of authority not turned over to Larson in the executive order, though President Truman again said he intended to make this shift. The plan is to transfer to Larson the minerals and metals procurement and stimulation program of ECA.

President Truman repeated his basic intention of making DMPA a workable agency in the procurement of materials needed for defense. This seems to leave the door open for additional transfers of authority to Larson if the need becomes apparent.

Machinery Threatened

Early in World War II, manufacturers were denied raw materials to make mining machinery. They turned to making machine-tool components or direct military goods. By the time WPB awoke to the full value of mining machinery to a war economy, the manufacturers were under contracts which required a year to work off. They finally got switched back to making mining equipment, but only after a serious loss of output.

The Mining Machinery Advisory Committee said that NPA allotments of raw materials to some manufacturers were insufficient to fill orders from mines and smelters. If they can't get more materials allotted to them for mining machinery, they will convert to machine tools or military items, industry spokesmen said. They described this as the one sure way to get all the raw materials they need.

Fourth-quarter aid to manufacturers was promised wherever possible, in the form of supplemental allot-

LAND OFFICE TRANSFER

A bill in Congress (S-1149) to reorganize the Department of Agriculture in conformance with the Hoover Commission's report calls for the transfer of the Bureau of Land Management from Interior to Agriculture.

Although the mining industry has had its differences with the agency under Interior control, experience with the Forest Service indicates that mining industry viewpoints would be much less sympathetically received by the Department of Agriculture.

If this concerns you, write your members of Congress.

AMORTIZATION PROJECTS CLEARED BY DMA
(To August 27, 1951)

Company	Location	Mineral	Amount	Per Cent
C. L. Maguire	Wickenberg, Ariz.	Copper	$76,000	75
Reynolds Metals Co.	Hurricane Creek, Ark.	Alumin	13,000	80
Aluminum Co. of Am.	Rosiclare, Ill.	Non-ferrous	376,000	80
Kaiser Al. & Chem. Co.	Baton Rouge, La.	Alumin	16,500,000	80
Jones & Laughlin Ore Co.	Tracy Mine, Mich.	Ferrous ores	9,094,000	85
St. Joseph Lead Co.	Bonne Terre, Mo.	Lead-Zn	4,964,000	60
Miss. Lime Co.	St. Genevieve, Mo.	Lime	1,252,000	75
Am. Zinc Co. of Tenn.	St. Louis, Mo.	Zinc	267,000	60
St. Joseph Lead Co.	St. Francois, Mo.	Lead	785,000	60
Am. Smelting & Rfg. Co.	Omaha, Nebr.	Lead	160,000	60
Nev.-Mass. Co.	Tungsten, Nev.	Tungsten	125,000	60
St. Joseph Lead Co.	Balmat, N. Y.	Zinc	833,000	60
Jones & Laughlin Ore Co.	Benson Mine, N. Y.	Ferrous ores	2,951,000	85
Defense Project, Inc.	Maple Grove, Ohio	Refrac.	3,500,000	75
Standard Lime & Stone Co.	Pleasant Gap, Pa.	Lime	1,551,000	75
Standard Lime & Stone Co.	Pleasant Gap, Pa.	Limestone	901,000	75
Orefraction, Inc.	Pittsburgh, Pa.	Ferrous ores	73,000	75
Universal Expl. Co.	Jefferson City, Tenn.	Zinc	1,037,000	60
Dow Chemical Co.	Freeport, Tex.	Magnes	5,468,000	50
Am. Smelting & Rfg. Co.	Corpus Cristi, Tex.	Zinc	6,666,000	60
Am. Smelting & Rfg. Co.	Amarillo, Tex.	Zinc	58,000	60
Am. Zinc Co. of Ill.	Dumas, Tex.	Cadmium	407,000	60
Armco Steel Co.	Rusk, Tex.	Ferrous ores	1,500,000	85
Kennecott Copper Corp.	Bingham, Utah	Copper	2,616,000	75
Reynolds Metals Co.	Longview, Wash.	Alumin	9,999,000	80
Kaiser Al. & Chem. Co.	Mead, Wash.	Alumin	12,790,000	80
Iron Ore Co. of Can.	Quebec, Can.	Ferrous ores	85,750,000	75
Kaiser Al. & Chem. Co.	Jamaica, B.W.I.	Alumin	9,500,000	80

EXPLORATION CONTRACTS CLEARED BY DMA
(To September 10, 1951)

Company	Co. & State	Mineral	Total Cost	Gov't Share
Am. Asb. Cement Corp.	Gila, Ariz.	Asb	$123,869	$111,482
Ashley & Gold	Sevier, Ark.	Anti	16,913	12,685
Black Rock Min. Co.	Mono, Cal.	Tung	61,624	46,218
Sierra Copper Co.	Calaveras, Cal.	Copper	16,613	8,306
United M. & L. Corp.	Gilpin, Colo.	Lead-Zn	20,000	10,000
Rhode Island Min. Co.	Shoshone, Idaho	Lead-Zn	23,900	11,950
Sunset Min., Inc.	Shoshone, Idaho	Lead-Zn	63,725	31,863
Ruby Meadows Min. Co.	Idaho, Idaho	Mona	14,052	12,647
Snoose Mining Co.	Blaine, Idaho	Zinc	135,000	67,500
Hope Mines, Inc.	Bonner, Idaho	Lead	36,000	18,000
Calumet & Hecla Consol. Copper Co.	Houghton, Mich. Keweenaw, Mich.	Copper	568,193	284,097
Shelton Mining	Jasper, Mo.	Lead-Zn	14,000	7,000
Brown Lake Tungsten	Beaverhead, Mont.	Tung	33,290	24,968
Ambassador Min., Inc.	Sanders, Mont.	Lead-Zn	23,049	11,524
W. R. & C. B. McLure	Granite, Mont.	Tung	16,382	12,286
Elkhorn Mining Co.	Jefferson, Mont.	Uranium	25,695	23,125
Hughesville Mining Co.	Cascade, Mont.	Lead	10,000	5,000
Elkhorn Mining Co	Jefferson, Mont.	Uranium	12,800	11,520
Am. Alloys Metals, Inc.	Beaverhead, Mont.	Tung	21,994	16,495
Trammell Mining Co.	Avery, N. C.	Mica	3,400	3,060
W. Hunter & J. Sullins	Macon, N. C.	Mica	500	450
Franklin Dev , Inc.	Macon, N. C.	Mica	3,600	3,240
Fred P. Cabe	Macon, N. C.	Mica	4,885	4,396
Lawrence S. Penland	Macon, N. C.	Mica	500	450
E. H. Zachary	Macon, N. C.	Mica	2,705	2,434
Mica Development Co.	Macon, N. C.	Mica	6,000	5,400
Black Hills Keystone	Pennington, S. D.	Mica-Be	23,080	20,772
Lewis W. Collingwood	Custer, S. D.	Mica-Be	10,000	9,000
Paulsel Mining Co.	Brewster, Tex.	Mercury	75,900	56,925
Maravillas Min. Co.	Brewster, Tex.	Mercury	10,450	7,838
East Utah Mining Co.	Wasatch, Utah	Lead-Zn	109,174	54,587
Privateer Mining Co.	Juab, Utah	Lead-Zn	8,062	4,031
Park Utah Consol.	Wasatch, Utah	Lead-Zn	42,000	21,000
Vermont Copper Co.	Orange, Vt.	Copper	51,382	25,681
Kenneth L. Porter	Hot Springs, Wyo.	Sulphur	99,150	49,575

ments of materials. NPA also said it was considering an order which would schedule the delivery of machinery to mine operators.

GSA Moves at Last!

Government agencies have agreed on the terms of purchase contracts for 170,000 tons of copper as a means of expanding production. The contracts have been submitted to the companies involved. If they are accepted, the long-delayed expansion in copper will finally get underway.

Purchase contracts for 28,080 tons of zinc and 241,270 tons of fluorspar have also been drawn up by General Services Administration, for submission to producers.

Thus far, aluminum tops the lists of products underwritten in this way. Producers have contracts for $427,400,000 worth of output.

Molybdenum is next with a $103,530,000 purchase commitment from the Government. There is a $23,500,000 magnesium purchase program, $15,000,000 for titanium and $11,900,000 for platinum.

The entire purchase program is going into a double overhaul: first because of DMPA's intention to absorb the job from GSA, and second because of new terms written into the Defense Production Act. Formerly, the entire commitment to purchase had to be entered as a liability against the Government even if the agreement was contingent upon a drop in the price, with little likelihood of actual Government loss. Now the contingent liability is to be considered an obligation of the Government only to the extent of probable ultimate net cost. It is likely that out of the overhauling will come a greater emphasis on this type of expansion assistance.

Brief, But Important

MINERAL EXPANSION — Interior Department asserts that plans now under way will make the following additions to annual mineral and metal production: copper, 40,900 tons; lead, 35,706 tons; zinc, 76,201 tons; cadmium, 309,000 lb.; antimony, 116 tons; aluminum, 476,350 tons; alumina, 888,500 tons; bauxite, 2,243,750 tons; magnesium, 54,000 tons; titanium, 4,218 tons; tungsten, 127,000 lb.; molybdenum, 14,068 tons; magnesite, 71,410 tons; calcined clay, 86,000 tons; and fluorspar, 16,000 tons.

CHROME PURCHASE—Until June, 1955 and up to 200,000 ton limit, Government will underwrite domestic chrome price at $115 per ton for lump, $110 for fines, 48% Cr_2O_3 and 3-1 Cr-Fe ratio. Purchase depot is at Grants Pass, Ore.

TUNGSTEN ORE DEPOSITS—Senator Lyndon Johnson wants purchase depots for tungsten ore, says small producers complain of terms offered by mills now handling ore purchases.

DEVELOPMENT EXPENSE—Senate will apparently follow House in making development cost deductible as expense against ore when mined, may add option to deduct currently.

DEPLETION CHANGES—Senate Finance Committee has cut House rates from 15% to 10% on borax, fullers earth, tripoli, refractory clay, quartzite, perlite, diatomite, and metallurgical limestone. It added asbestos, magnesium compounds and wollastonite at 10%, aplite at 15%, slate at 5%.

EXPLORATION CONTRACTS — As of Sept. 10, DMA had cleared a total of 128 contracts involving $4,691,379 of Government and $3,323,467 of private funds (see opposite page).

LABOR THIS MONTH

Joseph M. Gambatese, McGraw-Hill Washington News Bureau

STEEL WORKERS STYMIED: The Kennecott settlement with Mine, Mill and Smelter Workers set back the CIO drive to regain bargaining dominance in nonferrous metal mining. It came on top of CIO steel union's poor showing in bargaining elections. Close observers feel CIO will have to set up a nonferrous mining union to make real gains. Miners won't flock to Steelworkers.

NONFERROUS CIO UNION? It was proposed before World War II by die casting workers. It would have included aluminum and brass workers as well, but Murray absorbed aluminum workers in his steel union, and brass workers are tied to Reuther's auto union. Chances of reshuffling into a single nonferrous union are practically nil. Result: CIO gains in nonferrous mining will make headway slowly.

COPPER & BRASS: UAW-CIO's Copper and Brass Council got tough, threatening a strike Sept. 24 of 25,000 copper and brass workers in Connecticut Valley and the Midwest. Union claims contracts with companies representing about 60% of the country's copper and brass-rolling mill and fabricating capacity. Major issue is wages.

KENNECOTT PACT: Agreement with Mine-Mill grants 19½¢ "package" hourly increase, retroactive to July 1, and permitting a wage reopening next Jan. 1. The "package," subject to Wage Stabilization Board approval, is made up of 8¢ general wage increase, average of 7¢ for job reclassification, and 4½¢ for pensions. Mine-Mill called it a "pattern."

OTHERS RELUCTANT: Other mining companies hesitated to accept the Kennecott agreement for various reasons: The settlement seemed to exceed wage-control limits, higher-cost operations couldn't afford it, some had pension plans, the Jan. 1 reopening was too soon.

THE INJUNCTION: Refusal of other companies to settle with Mine-Mill on the Kennecott terms caused President Truman to get an 80-day Taft-Hartley national emergency injunction at Denver on Sept. 5. Copper miners, who had struck Aug. 27, began returning to work immediately. The injunction covers Mine-Mill and 32 companies, will expire about Nov. 24. Meanwhile, efforts at settlements will continue with aid of the Government.

WSB O. K. LIKELY: The Government will not upset the Kennecott settlement. Apparently, the 8¢ general increase fits the cost-of-living wage formula. WSB recommended such an increase in the CIO steel union dispute at American Smelting & Refining Co.'s Garfield smelter, and both sides accepted it. WSB suggested further bargaining on job reclassifications and pensions, but did not indicate how much in higher costs it would approve.

AS&R AND STEEL: This is how WSB figured the 8¢ increase: Average straight-time hourly earnings at the Garfield smelter were $1.43 in January, 1950. The 10% formula permits an increase of 14.3¢. The new cost-of-living policy allows another 2.2% increase above last January's rates of $1.53, or 3.3¢. Adding 14.3 and 3.3 gives you 17.6¢ as the total increase allowed above January, 1950, levels. Deducting a 10¢ increase granted last October, leaves 7.6¢, which rounds out to 8¢. Incidentally, you may grant this type of increase without getting prior approval from WSB.

MINE-MILL OFF AIR: Radio station KSIL at Silver City, N. M., denied Mine-Mill local 890 further use of four 10-minute broadcasting periods a week until it puts on "sane, sensible programs." The local has been on strike since last October at New Jersey Zinc Co.'s Empire Zinc division. KSIL says union broadcasts have been against the public interest.

THIS MONTH IN MINING

CHECKER weighs each bar of silver. Bars vary slightly in weight because of air bubbles entrapped in casting.

UNDERGROUND STREAMS in lower levels keep pumps going continuously. Miners get a special bonus in wet places, as above.

UNDERGROUND CHAPEL is visited frequently by the ever-religious miners who stop to pray both coming on and going off shift.

Mexico—Champion Silver Producer

SINCE THE DAYS of the Conquistadores in the 16th century, Mexico has been among the world's leading silver producers. Its peak of importance as a silver producer was at the close of the 18th century, when it accounted for 2/3 of the world production. Today it has reached a point where it consistently supplies about 1/3, or about 20 million ounces more a year than its closest competitor, the United States. Last year production totalled 49 million ounces.

Largest silver mining operation in Mexico today is the Real del Monte Silver Mining Co. in Pachuca, about 50 miles north of Mexico City. A total of 120 sq. mi. is mined to a depth of about 2,500 ft. below the surface.

Some 40 mines, all of them connected underground, produce a total of almost a ton of pure silver a day. The metal is extracted from the generally lean ores by cyanidation.

Today the silver producers belong to the Mexican Government, but the bulk of development of these mines was originally done by British and American investors.

(This Month in Mining continued on page 102)

Exide-Ironclad

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They PROVIDE ample power for fast, high-production haulage—more trips per shift, dependable round-the-clock performance, with no end-of-shift slowdown, no unscheduled down time . . . ASSURE inherent safety, with freedom from hazards of fire, fumes, noise . . . SHOW low costs of operation, maintenance, repair, depreciation. SIZES for all makes of battery-powered mine locomotives, trammers, shuttle cars. Call in an Exide Representative and let him prove these facts.

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Freeport to Develop New Louisiana Sulphur Find

A major deposit of sulphur has been discovered by the Freeport Sulphur Co. 100 mi. southwest of New Orleans. It is in the caprock of the Garden Island Bay salt dome in the marshlands near the mouth of the Mississippi River (oil is being produced from the flanks of the dome). Freeport obtained sulphur rights early in 1951 from the Texas Oil Co., and under its lease will pay the oil company 50% of the operation's profits.

In order to develop the deposit, Freeport plans to build a $10 to $15 million plant with a goal of producing 500,000 long tons of sulphur yearly. The final amount to be spent will depend on such factors as thermal efficiency, quality of sulphur, and special difficulties encountered. Initial production is expected in 1953. Final processing will be done at the Port Sulphur plant.

Tungsten Mine and Mill to Expand to 600 Tons by '52

The Tungsten Mining Corp. has retained Southwestern Engineering Co. of Los Angeles as architect-engineer to conduct metallurgical investigations, and prepare the necessary plans and specifications for increasing capacity from 250 to 600 tons of hubnerite-scheelite ore per day at its operation, 16 mi. northwest of Henderson, N. C.

A new crushing section will be installed in which modern steel suspension crushed-ore bins will have ample capacity for the increased tonnage. The grinding circuit will use peripheral-discharge rod mills rather than crushing rolls as in the existing installation.

To maintain continuous production during the expansion, the additional capacity will be installed in sections operating in parallel with existing units. Plans call for completion of engineering during September, 1951. completion of construction during March. 1952. Management is simultaneously stepping up production at the Hamme mine to increase production to 600 daily tons by March 1952.

U. S. to Oppose Higher Gold Price, Snyder Says

Secretary of the Treasury John W. Snyder informed the press on Sept. 7 that the United States is opposed to any increase in the price of gold over $35 an ounce.

He could see no good reason for this country to pay a higher price, he told a news conference, adding that nothing would contribute more to a world-wide inflation of prices than a higher price for newly mined gold.

Mr. Snyder declared that the International Monetary Fund and World Bank is making a study of the gold price, which should be completed before the end of the year.

Representatives from 50 member countries assembled in Washington Sept. 11 for the sixth annual meeting of the Fund. The discussions will center on monetary problems. Foreign exchange restrictions, originally scheduled to end next March, are also expected to occupy a key position on the program.

Four domestic mining groups which have appealed to the Fund for a change in its gold-pricing policy are the California Gold Committee, Western Mining Council, The Colorado Mining Association, and the Mining Workers Protective League.

Nickel-Copper Discovered Near Mesabi-Vermillion

Twelve miles southeast of Ely, Minnesota, a nickel-copper deposit was recently discovered. Mineralization so far exposed is disseminated chalcopyrite-pyrrhotite-pentlandite in basic igneous rock some distance above the base of the Duluth gabbro. Metal content of the zone, according to preliminary guesses, is about 1% combined nickel and copper.

The surface exposure of the deposit is a slightly gossanized outcrop which persists strikewise for approximately 1,000 ft. One vertical bore hole penetrated 81 ft. of mineralization and was stopped while still in the mineral. Using presently available data, no estimate of the true thickness of the deposit can be made.

The discovery is in Section 5, T61N, R11W, between the Vermillion Range and the Mesabi extended, at a point about 70 mi. north of Duluth. It is on national forest land, except for portions under rivers or lakes, which minerals belong to the state of Minnesota.

Present explorers, Roger Whiteside of Duluth and his brother-in-law, Childers, are planning to drill with a larger rig to deepen the present hole which stopped in the mineral.

Two New Uses for Perlite Packaging and Drilling

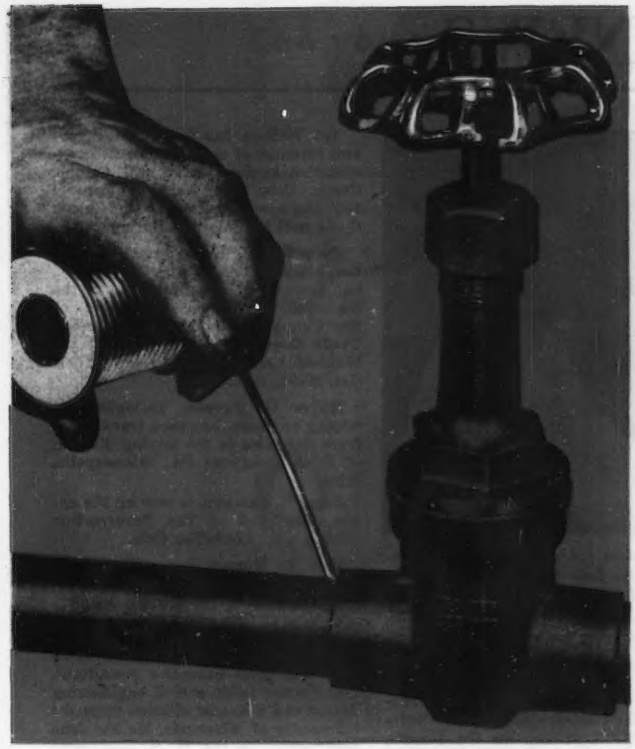
Perlite, the skyrocketing new lightweight aggregate, is now used as a resilient and absorbing packing for fragile containers, such as bottles of chemicals. Advantage—the perlite is capable of absorbing contents of the bottle in case of breakage. Great Lakes Carbon Co., major producer of perlite, also announces that the expanded non-metallic is now marketed as "Strata-Seal," a light-weight additive for oil drilling muds which is reported to prevent loss of circulation and drilling mud. (Note: In some exploratory churn-drilling operations, bentonite has been used for the same purpose.)

More information concerning perlite, its uses, and sources of supply, is available from The Perlite Institute, 35 West 53rd St., New York, N. Y. In the last two years, a large number of new industrial uses have been found.

(Continued on page 122)

Drill Cuts Core From Reinforced Concrete With Carbide Bit

Test coring a reinforced-concrete abutment in Providence, R. I., posed a problem. The projected test holes were nearly horizontal, so the usual method of shot drilling could not be used; the core desired was of 6-in. diameter, and use of 6-in. diamond-drill bits would have been costly. An Acker Teredo drill, was fitted with a 6-in. carbide bit, and produced the above 12-in.-long core. Sensitive hydraulic control was important in avoiding unnecessary shock to the tungsten carbide.



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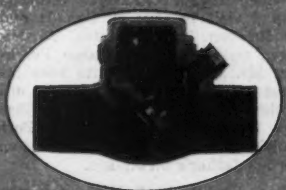

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PERSONAL NEWS

DR. CURTIS L. WILSON, dean of Missouri School of Mines and Metallurgy at Rolla, Mo., has been granted the Community Service Award of the Rolla Chamber of Commerce. The award is made by the Chamber to those citizens of Rolla who have made outstanding contributions to the welfare of the community without personal gain. MAURICE E. SUHRE, president of the Chamber, is shown presenting the award.

Samuel L. Wright has been elected to the board of directors of Central Eureka Mining Co., San Francisco, replacing **Arnold E. Walters.**

Rodgers Peale, consulting mining geologist, has returned to his San Francisco headquarters at 315 Montgomery St., after a protracted professional trip to Europe.

William Wallace Mein, former president and founder, has been elected chairman of the board of **Calaveras Cement Co., San Francisco. William Wallace Mein, Jr.,** is now president; **H. C. ("Pat") Maginn, executive vice** president. A. A. Hoffman, consulting engineer, was elected vice president.

Edwin Sweetman, mining engineer of Green Bay, Wis., recently returned from a visit to Eastern Canada and the Eastern United States. Among places visited was the Gaspe Peninsula. Mr. Sweetman reports keen interest by Gaspe residents in the undeveloped copper deposits of that area. He has many relatives in Port Daniel, on the Peninsula, which town was his father's birthplace.

R. K. Poul, Hubbell, Mich., has been made superintendent of Calumet & Hecla's smelter, mill and reclamation plants.

Edward F. Johnson, Virginia Minn., has been appointed foreman at Oliver Iron Mining Co.'s eastern district concentration plant there. **Kenneth McInnis** has been named superintendent of Oliver's Canton mine at Biwabik, Minn.

Jack Chisholm, acting superintendent of the Canisteo mine of the Cleveland-Cliffs Iron Co., on the Mesabi, has resigned to go with the Steel Company of Canada, Hamilton, Ont. He has been succeeded by **Ronald Pearson,** Hibbing, Minn., assistant chief engineer. **Allan B. Hollett** has been made assistant chief engineer at the Hibbing office.

Robert Youtz has left his position as shift boss for Resurrection Mining Co., Leadville, Colo., to accept the title of quarry engineer with U. S. Gypsum Co. at Southard, Okla.

Donn M. Clippinger is now employed by Pumice Corporation of America at Grants, N. M., after 4 years as mining engineer for the New Mexico Bureau of Mines & Mineral Resources at Socorro.

D. C. Gilbert, formerly manager of Ophir Development Co., Ophir, Utah, is now manager of Nash Mines, Patagonia, Ariz.

T. C. Baker is presently with DMA as chief of the Foreign Division in Washington, D. C. Mr. Baker is also employed in a consultaing capacity by Lake George Mine, Ltd.

Herbert Wilson Smith, Washington, D. C., attorney, announces his return to the practice of law with particular relation to Federal Government procedures.

Anthony Sutich, Rapid City, S. Dak., has joined the engineering department of the Pacific Isle Mining Co.

Art Wallace has been named general foreman of maintenance and construction at the Carlton mill, Cripple Creek, Colo. Mr. Wallace formerly held the same position at the Golden Cycle mill in Colorado Springs.

Cornelius F. Kelley, chairman of the board of Anaconda Copper Co., has accepted the chairmanship of the National Convention Committee of the Thirty-Eighth National Foreign Trade Convention to be held at the Waldorf-Astoria Hotel, New York, Oct. 29-31, 1951.

Mayer G. Hansen, geologist and mining engineer, has been transferred from the sales to the mining division of E. J. Longyear Co., Minneapolis, Minn.

John W. Lampert is now on the engineering staff of The Resurrection Mining Co., Leadville, Colo.

Earl E. Hunner has retired from The M. A. Hanna Co., where 34 of his 50 years in the iron mining industry were spent. Starting as assistant manager of Lake Superior operations, he became general manager and, since 1946, has been executive consultant. Mr. Hunner holds a civil engineering degree and a special citation from the University of Wisconsin. He has done field work for the U. S. Geological Survey, railroad location surveying and lode gold mining and introduced many new methods of mining.

James M. Erwin, controller, The M. A. Hanna Co., Cleveland, Ill., will preside at a special industry conference of controllers of companies in the mining and extractive fields, to be held in conjunction with the 20th Annual Meeting of the Controllers Institute. The gathering will take place Sept. 30 to Oct. 3, in the Waldorf-Astoria, New York.

S. D. Michaelson, formerly chief engineer, coal mines, Tennessee Coal, Iron & R.R. Co., U. S. Steel Corp. subsidiary in Birmingham, Alabama, has been appointed to the post of chief engineer for raw materials for the same company. He is also a vice chairman of the Minerals Beneficiation Div. of the AIME.

John R. Bogert is now employed by Kennecott Copper Corp. in their South American exploration department. As a geologist Mr. Bogert will be doing examination work throughout Peru, Ecuador, Bolivia, and Chile. Residence is in Lima.

Promotions in Cleveland Cliffs Iron Co. are: **Stanley W. Sundeen,** geologist, Ishpeming, Mich., has been appointed assistant manager under **C. W. Allen,** general manager. Mr. Sundeen will be in charge of a special program on investigation, develop-

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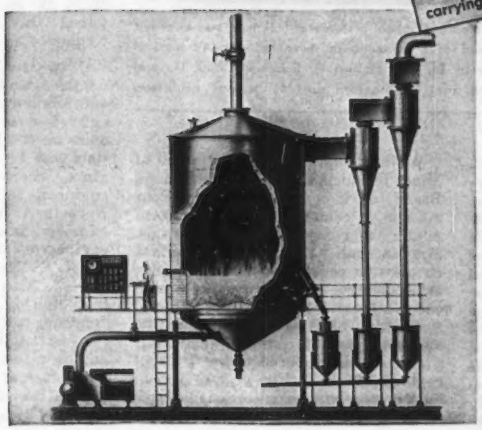
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DR. CHARLES F. PARK, JR., Dean of the Stanford School of Mineral Sciences, was awarded the Certificate of Achievement at the end of a three-month survey of Japan's mineral resources. The presentation is being made by Lt. Col. Hubert G. Schenck, Chief, Natural Resources Section, GHQ, SCAP, on leave from his Stanford post as geology professor.

ment, and research of new properties. On the Minnesota Range: **Onnie Marjama**, formerly superintendent of the Lloyd and Spies mines, is now superintendent of the Lloyd and Cliffs Shaft mines. **T. A. Kauppila** is the new superintendent at Lloyd and Spies. **Robert M. De Gabriele** will be operating mining engineer at the Lloyd and Cliffs Shaft mines, and **Carl Christianson** will be underground foreman at Spies. In Coleraine, the new superintendent of the Canisteo mine is **Ronald B. Pearson**, formerly assistant chief engineer of the Mesabi district.

Frank Dumbrosky, pit foreman for Pickands Mather & Co. at Keewatin, retired on Aug. 1. He is succeeded by **Charles Johnson**, was was assistant pit foreman.

Willard P. Fuller, Jr., has left his position as resident geologist for the Anaconda properties in the Tintic district, Utah, to join the staff of the Original Sixteen to One Mine, Inc., at Alleghany, California.

Dave E. Wick, formerly with Kaiser Steel, is now a mining engineer with Reserve Mining Co. at Babbitt, Minn.

Activities at Climax Uranium Co., Colo., are being expanded. **Marvin Kay** is the new vice president and general manager. **E. J. Duggan**, vice president, and **Blair Burwell**, general manager, will continue as part-time consultants.

Louis Sonneveld has left his position as junior mining engineer with **Mauricio Hochschild**, S.A.M.I., Bolivia, to join Sigma Mines (Quebec), Ltd., Bourlamaque, Quebec, as a member of the study group in the engineering department.

William Robert Marshall, Bureau of Mines technician, is in Rio de Janiero, Brazil, on a cooperative Point Four mission in connection with important mining and metallurgical problems. Mr. Marshall will serve as consultant on matters concerning Brazilian mineral resources and will cooperate with the National Department of Mineral Production of Brazil on beneficiation and treatment of mineral materials that may be produced there. He will replace **Frank E. Noe** of the Bureau of Mines, who worked on cooperative projects in Brazil for the past six and one-half years. Mr. Noe has been transferred to Mexico as chief of the Mines Bureau Point Four mission there.

Dr. William B. Mather, Southwest Research Institute's chairman of mineral technology, has been granted leave of absence to participate in an economic mission to Brazil, part of the above-mentioned Point Four program.

Heath Steele, vice president of The American Metal Co., Ltd., and president of its Mexican subsidiary, Compania Minera de Penoles, is visiting the Penoles properties in Mexico during September.

From Chile Exploration Co. in Chuquicamata, Chile, comes news that **Edward Tierney** is the new plant superintendent. **George E. Morris**, formerly assistant plant superintendent at Potrerillos, Chile, is smelter superintendent and **D. Scott Sanders**, formerly of Cerro de Pasco, is concentrator superintendent.

Harry J. Wolf examined talc mines in New York during early August, and has gone to Colorado and Wyoming to investigate tungsten, uranium, and sulphur deposits.

Roger Swindle and **Theodore Brey** are now members of The M. A. Hanna Co. engineering department at Iron River, Mich.

Gerald E. Eddy, formerly Michigan state geologist, has been appointed director of the State Department of Conservation. **Franklin G. Pardee** is now state geologist and **Wayland Osgood** deputy director of the Conservation Department.

P. L. Lockridge, formerly general superintendent of the Torreon Smelter of the American Metal Co., has become superintendent of the smelter at Socavon in the state of Queretaro, Mexico, for Compania Minera Esmeralda, S. A.

Donald S. Skufca, mining engineer, is now with Jones & Laughlin Ore Co. engineering department in Ishpeming, Mich. **H. H. Vaughan**, chemist, has joined the research laboratory in Negaunee.

Oliver Iron Mining Co. reports some transfers and promotions in Michigan and Minnesota: **Richard Strong**, geologist, is now located at the Ishpeming office on the Marquette Range. **Ian L. Reid** has been transferred from Virginia, where he was assistant chief engineer, to Duluth as a geologist. **Norman A. Moberg**, formerly mining engineer, is supervisor of the mining engineering division at Duluth, where **Ralph W. Marsden**, geologist, is now located. Also in the mining engineering division at Duluth is **Everett Johnson**, transferred from the Canisteo district. **John C. Howbert**, mining engineer, formerly in the Canisteo district office at Coleraine, has been appointed assistant chief engineer of the Gogebic Range mines.

Recent promotions in the Inter-State Iron Co. on the Mesabi Range, Minn.: **H. W. Gillespie**, personnel director since 1946, has been appointed assistant superintendent of the Columbia, Schley, Pettit, and Wentworth mines, of which **Paul W. Kruse** is superintendent. **Richard H. Hanson**, mine industrial engineer for the past year, is the new personnel director. **C. E. Dickens**, supervisor of employment and training, has been appointed mine industrial engineer and **LeRoy Nelson**, safety inspector, is supervisor of employment and training. **Tom Stevenson**, geologist, has joined the engineering staff of the company at Virginia.

At United States Potash Co., Carlsbad, N. M., **R. H. Mills** has been appointed refinery superintendent and **L. A. Tillotson**, chief chemist.

Herbert H. Lauer, consulting industrial and cement plant engineer, has moved his office from Philadelphia, Pa., to 1008 East Central Ave., Orlando, Florida.

Erving Walters has been appointed superintendent of mining operations at Austin Jumbo Mines, Inc., gold property near Winnemucca, Nev.

OBITUARIES

C. S. J. Trench, since 1929 editor and publisher of *American Metal Market,* and for 50 years active in the tin trade and metals industry, died Aug. 20 in Staten Island, N. Y., after an illness of several months. He was 71. In 1901 he became associated with the metal brokerage firm of C. S. Trench & Co., founded by his father in 1881. He was the first president of the American Tin Trade Association, an associate member of the American Zinc Institute, the AIME, and of the American Iron and Steel Institute.

Charles W. Morse, 77, retired superintendent of the zinc concentrator of the reduction department of the Anaconda Copper Mining Co., died at his Dover, N. H., home, Aug. 19. Mr. Morse was a native of Grass Valley, Calif., and a graduate of the University of California.

Richard McCarthy, a resident of Butte, Mont., for over 35 years, died on Aug. 23. Until 1947, he owned the McCarthy Assay Office, which he sold to Everly & Hammond. A native of Madelia, Minn., he received a degree from Carlton College and took a post graduate course at Yale.

L. Douglass Anderson, 72, consulting engineer for Potash Company of America, Carlsbad, N. M., died July 31 as the result of an automobile accident. Mr. Anderson joined the company in 1933 and retired in 1944. He assisted in the construction of the company's first refinery, helped develop its flotation process, and held numerous patents.

Hugh Park, 71, who retired this year as president of Nipissing Mining Co., died at Haileybury, Ont. Born in the United States, he moved to Canada in 1907 after a brief experience in western mining fields following his graduation from Stanford University. He was connected with Nipissing for 44 years, and had occupied the presidential chair since 1940.

John P. Bickle, 66, chairman of the board of McIntyre Porcupine Mines, died in Toronto. Connected with the company for 37 years, and its president for more than 20 years prior to 1940, he was largely responsible for the policies under which the company acquired giant stature after a difficult start. One of the most dynamic and magnetic persons on the Canadian scene, he was well known as a financier, industrialist, sportsman, and world figure.

Oscar W. Cole, 59, purchasing agent for the Oliver Iron Mining Company, died on Aug. 21. He had been an Oliver employee for 42 years and a resident of Duluth, Minn.

Lee Bailey Carroll, 60, Anacortes, Wash., an executive since 1930 of the Kaaba-Texas Silver Mines at Nighthawk, Wash., died Aug. 6 at Seattle, Wash.

Letter to the Editor

DEAR MR. JUST:

It would be my pleasure to share your point of view of the "limited leverage of gold in our present economic situation." Unfortunately, I am unable to agree with the third paragraph of the caption you gave to my graphic, "The Value of the U. S. Dollar," published in the September issue of the ENGINEERING AND MINING JOURNAL.

Will you therefore permit me to amplify *my* point of view, according to which ". . .a depression is impending whenever such artificial stimuli to our economy as the defense effort fade out, unless the Government resorts to a revaluation of gold, bringing gold values in line with purchasing power values."

We have to expect that, sooner or later, the defense effort will slow down. This slowdown will force us to face the hard facts of deflation, which, unfortunately, follows every inflationary experience.

From 1940 to 1951, we have financed our wars with taxes and with the creation of "additional (paper) purchasing power" and during this period, we had to increase:

1. The federal debt—six times
2. Currency in circulation four Times
3. Bank deposits—2½ times.

Total currency liabilities, represented by these three pillars of dollar value rose from a sum of $230 billion in 1940 to approximately $460 billion today.

As we are unable to reduce these amounts in any considerable proportions, we will have to adjust our thinking to the *de facto* devaluation of the dollar to half of its purchasing power of 1940.

Whenever our defense effort will cease, the Government's injections of additional purchasing power into the economic system will also cease.

The consequence of the absence of such "injections" will be a depression of not yet predictable depth. At the first serious break of the price level, ancient makeshift measures like higher price floors or WPA programs can help, but for a short time only. The stabilization of prices, wages and employment at "predeflation level" cannot be attained. New approaches to the problem will have to be found and the choice of methods is very small.

In spite of former and present principles of economy, a depression, result of interrupted inflation, can be cured by currency therapy only. Depressions change the mood of the public. They also make the sale of Government bonds practically impossible and diminish tax collections. They increase the opposition to the Government. Therefore, the Administration in power will have to act fast and intelligently in order to stop prices from further decline, to keep people employed and wages high.

The gold value of the dollar, as measured by black markets—which traditionally are free from official price regulation—has not yet declined as much as the purchasing power of the dollar. Today's greenback still is worth about 84¢ in fine gold.

If we want to maintain prices at the present level—without new inflation—we will have to give a new gold backing to our currency. This backing which was not necessary as long as we spent for armament, will be forced upon the Administration once the "emergency" is over. At this time, it will not be a 84 gold cents' dollar which will do the job, but a dollar of at most 50 gold cents. That means that we will have to increase the price of gold to $70 an ounce, against today's level of $41 in free world markets and the purely nominal $35 valuation of the U. S. Treasury.

Certainly such a measure can be delayed, taken in many variations and steps, but it cannot be avoided. Socially, politically and strategically, we cannot risk a major depression.

As the French Minister of France Paul Reynaud, said in 1935, "Devaluations of the currency have to be made ahead of time and not when it is too late." The French Parliament did not believe him in 1935, but had to yield unconditionally in September, 1936, when Europe's gold bloc countries were forced to increase the price of gold under deflationary pressure.

There are more similar examples in currency history, including our own devaluation of 1934, which, if decreed earlier, would have shortened the 1929-34 depression by at least three years.

Based on the rigid law of currency theory and the historic record, which do not have to yield to a Supreme Court, I feel sure that our gold price will have to be raised from $35 to at least $50 and most probably to $70 per ounce. Deflationary forces are much stronger than policies, which very, very seldom have been able to cope with complicated currency problems.

Very sincerely yours,
FRANZ PICK

Pick's World Currency Report
New York, New York

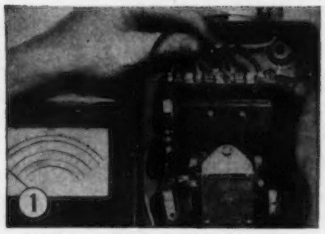
Editors Note: Our only difference with Mr. Pick's respected views is one of timing. Like him, we believe that fiat currency and fiscal tricks will come to the end of their rope, that continued inflation will reach an end, point in another depression, and that gold will then be revalued. He simply believes that the time is not far off, while we think the public will probably follow the financial Pied Pipers until the country simply "goes broke." Despite what has been done to fiscal integrity, this is still a rich country.
THE EDITORS

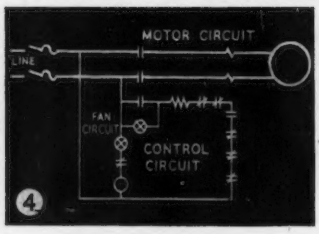
OPERATING IDEAS

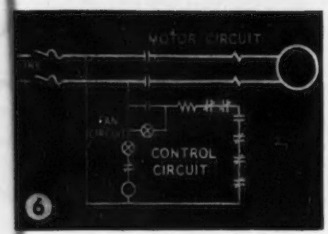
How to Check Four Well-Known Causes of Motor Trouble

BENJAMIN HANTMAN, Works Engineer, Motor and Control Division, Westinghouse Electric Corp., Buffalo, N. Y., tells you how to diagnose motor troubles.

Four well-known symptoms of motor trouble are as follows:







CASE I: Motor does not turn over, and is quiet.

CAUSE: Motor not getting voltage; main line open; control circuit open.

STEP 1. Check voltage at line terminals with a voltmeter or test lamp.

STEP 2. If no voltage at starter, check main switch and line fuses.

STEP 3. If power is available, check contactor to see if mechanically free to operate.

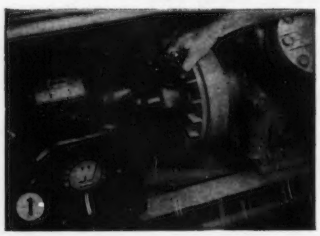
STEP 4. If contactor operates freely, check control circuit for possible open circuit as follows . . .

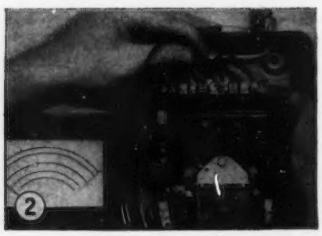
STEP 5. No voltage across the contactor coil means it is probably all right, and the control circuit is open elsewhere. Double check coil by measuring its resistance. BE SURE POWER IS OFF!

STEP 6. Check control contacts, motor overload relay, or motor protector.

STEP 7. Since most contacts are enclosed, check with voltmeter. A voltage across any contact indicates it is open.

STEP 8. Check for frayed wires and poor terminal connections. Vibration often is the cause of loose connections.





CASE II. Motor does not turn over, but growls or is noisy.

CAUSES: Mechanical jamming; undervoltage; faulty motor.

STEP 1. Try to turn motor shaft. If it does not turn freely, the load is jammed or the bearings are seized.

STEP 2. If shaft turns freely,

check line voltage with motor on the line. If voltage is less than 10% below name-plate rating, motor can't start under load. If voltage is within the rating and it's a 3-phase motor, check all three phases. One line may be found to be open.

STEP 3. If it's a repulsion or dc motor, check brushes for contact with commutator. Check for dirty commutator.

STEP 4. If it's a capacitor motor, check centrifugal switch or relay for operation—it may be stuck open, leaving the starting winding disconnected. Check capacitors by measuring with a resistance meter.

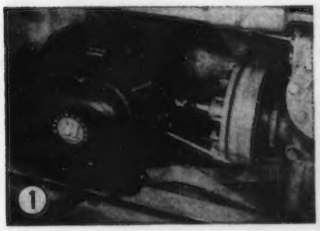
CASE III. Motor does turn over, but will not get up to speed.

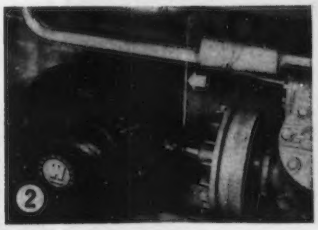
CAUSES: Undervoltage; overloaded motor; poor commutation.

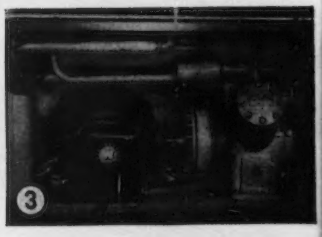
STEP 1. Check line voltage under motor starting conditions. It should not dip to less than 10% below the motor rating.

STEP 2. If voltage is satisfactory, motor may be overloaded. See that motor size is correct.

STEP 3. If it's a repulsion or dc motor, check for worn brushes or a dirty commutator. If it's a capacitor motor, perhaps the centrifugal switch isn't opening, leaving the starting winding on. This will result in eventual capacitor burnout.







CASE IV. Motor gets up to speed, but runs too hot.

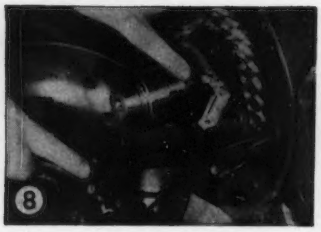
CAUSES: Under or overvoltage; poor ventilation; overload; faulty coupling; centrifugal switch; or starting relay.

STEP 1. Don't guess—measure the motor-winding temperature with a thermometer. A piece of clay or even chewing gum stuck on the bulb before it is inserted into the stator winding will help get an accurate reading. It should not exceed 90 deg. C (194 deg. F). Winding temperature is affected by ambient or enclosure temperature.

STEP 2. Ambient temperature should not exceed 40 deg. C (104 deg. F). Most drip-proof motors are rated a 40-deg. C rise by thermometer over a 40-deg. C ambient plus 10-deg. safety factor.

(Continued on p. 110)

OPERATING IDEAS—Check Motor Trouble *(Continued)*



STEP 3. Check ventilation of motor enclosure to see that the openings are not clogged with dirt or lint. Look for other obstructions.

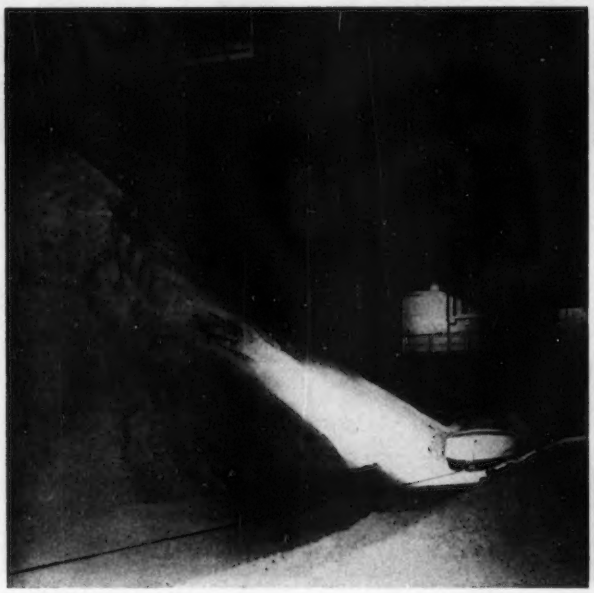
STEP 4. Check motor itself to make sure it is not fouled with dirt. A motor needs plenty of breathing space if it is to run cool.

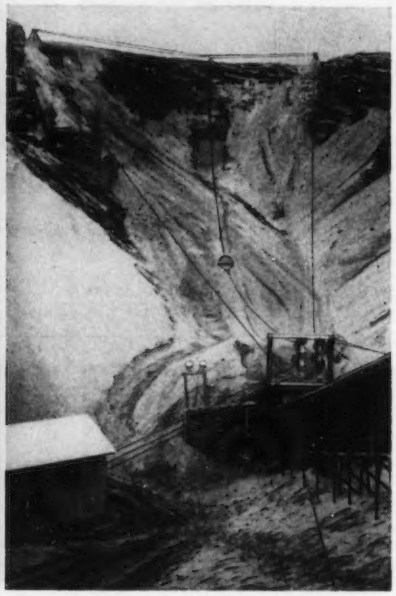
STEP 5. Check the line voltage to see that it is within 10% of the rated value. Either under or overvoltage will cause motor heating. If it's a 3-phase motor, check all three phases for proper voltage.

STEP 6. Check the motor current against the name-plate current to see if the motor is overloaded.

STEP 7. Check the line-up of the motor and its load. Maybe one or the other has shifted on its foundation. Misalignment causes added motor load, as well as rapid wear of couplings or belts.

STEP 8. Check proper operation of centrifugal switch or starting relay of single-phase ac motors, and the starting mechanism of repulsion of dc motors. Make sure the motor isn't cycling (repeated frequent starts) due to faulty control-circuit operation.



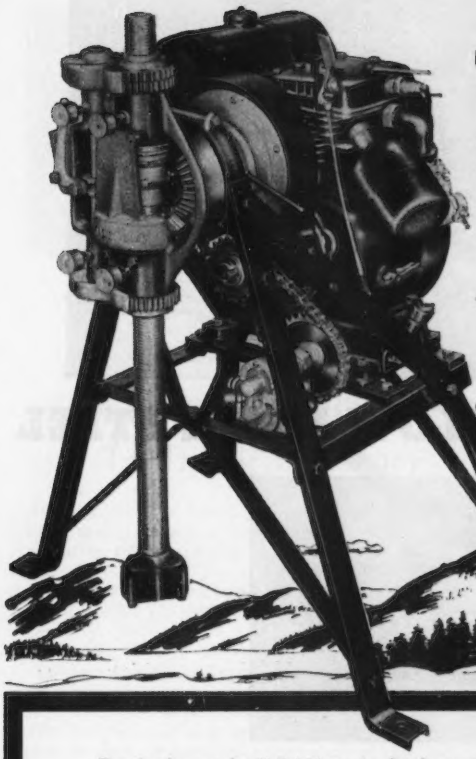


How Versatile Drag Scrapers Aid Stockpile Handling

Here are two interesting examples showing how drag scrapers can be used to store and handle large tonnages of stockpile materials.

At Arvida, Quebec, Aluminum Company of Canada, must store large quantities of bauxite, coke, and petroleum pitch under cover to protect them from weather and facilitate handling, crushing, and mixing of these items. Materials are stored in buildings with low side walls and a steep roof conforming approximately to the angle of repose of the materials stored in the buildings. Each structure is equipped with one or more Sauerman Power Drag scrapers as shown at left. Here we see a building 1,980 ft. long which holds about 450,000 tons of bauxite. A grinding room stands between two sections of the storehouse, with a 3-cu. yd. scraper operating lengthwise in each section. Bauxite is brought in by overhead conveyors. The scrapers reclaim to conveyors which feed the grinders.

At the right we see a 2-cu. yd. Power Drag scraper which is used to transport material from a 200-ft. high chat pile to a conveyor belt (lower right) which feeds a mill in the Tri State district. The scraper is equipped with a rapid-shifting arrangement at the tail end which permits control of the tail block by the operator of the scraper hoist housed in the building at lower left. The hoist has three drums, two to haul the scraper back and forth, and a third to operate the cable-shifting device. Capacity is 90 tons per hr. The long-reach drag scraper is particularly advantageous here because the chat pile is continually sloughing. Therefore workmen are not required to operate in the dangerous area with this equipment. Note interesting tail block shifter at top of photograph.



Take this rig anywhere

X-RAY

the world's lightest surface diamond drill

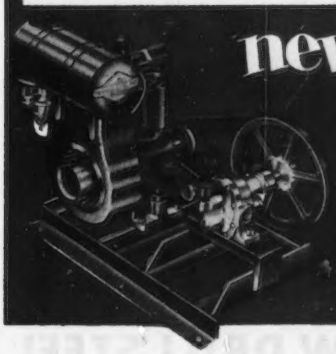
The featherweight X-RAY is absolutely unrivalled for preliminary exploration work in remote and difficult areas. Developed for use in Canada's rugged North country, it measures only 29"x 23½" x 32½". Yet it gives you better than 200 feet of ¾" core and drills a 1⅜" hole at any angle with two standard and five optional screw feeds.

185 lbs. net weight!

Fully assembled with swivelhead and gasoline motor, X-RAY is an easy 2-man load. For very difficult terrain it can quickly be broken down and reassembled. (Weight with interchangeable compressed air motor—157 lbs.)

5½ hours per gallon!

X-RAY is the world's most economical drill—in first cost and in day-to-day operation. All parts are designed to withstand hard usage. Normal fuel consumption is less than 1½ gallons (imp.) per 8 hour shift. Full details from bulletin No. 161.



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DRILLING COMPANY LTD.
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ANOTHER JOB for HOLLOW DRILL STEEL

When you're up against a tough, hard-rock drilling operation, set up your drills with Crucible Hollow Drill Steel. This quality steel is built to take the punishment of around-the-clock operation of modern, high air-pressure rock drills. And you have the assurance of minimum breakage . . . and an end to loss of expensive bits.

That's because *every* lot of Crucible Hollow Drill Steel is *pre-tested* before it gets to you. What's more, Crucible Hollow Drill Steel is backed by the experience of engineers and metallurgists who are drill steel specialists. They work right on the job with you . . . if you need them.

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CRUCIBLE first name in special purpose steels

51 *years of* *Fine* *steelmaking*

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NEW PRODUCTS DIGEST

FEATURES

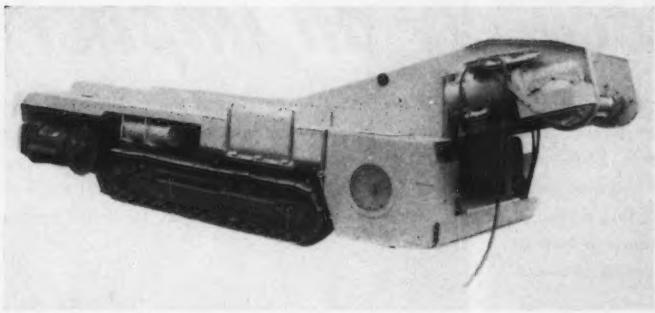
Gooseneck Design Adds To Trailer Efficiency

SEMI-TRAILERS in two of the most popular side-dump body designs are now being built in a gooseneck construction by Easton Car & Construction Co., Easton, Pa.

First of the new gooseneck trailers to be completed is the Model TL-1015, a lift-door side-dump of 15-ton capacity. This unit is designed for service with the Caterpillar DW-10 diesel tractor.

Shown at right in dumping position, the Easton lift-door body is especially designed for fixed-point dumping. The push-button-controlled overhead hoist operates a dual hook that engages two dumping bars on the lift door. The door is raised clear of the load, then serves as a bail to raise the body to the complete discharge angle.

The new gooseneck construction will also include 15 and 30-ton automatic drop-door trailer units. (1)



Crawler-Type Shuttle Car Now Ready

DESIGN FOR OPERATION in close quarters, the new cable-reel crawler-type shuttle car, recently announced by General Electric Co., has a turning radius of from 14 to 16 ft.

Radically different from previous shuttle-car designs using rubber-tired wheels, the new unit provides for light ground-loading pressures by distributing weight over a large area of crawler tread.

Because no clearance is required for turning wheels, a much wider than ordinary conveyor can be built into the body of the track-laying car for the same overall width. Unloading speed is thereby increased. Two drive motors are used, one on each track.

Two steering levers at the operator's position control the tracks. They are connected to the traction motor power circuits and to hydraulic brake valves. One sealed-type 3-hp. motor drives a pump supplying hydraulic power for auxiliary controls. (2)

When the heads come together, the spring-loaded cam rises (dotted lines) and then falls to lock the two heads securely, rigidly

O-B COUPLERS SAVE TIME AND WORK BY

Joining Securely on Impact

The illustration of two coupler heads coming together brings out an important point--they are joining without guidance or assistance of any sort. Mine cars equipped with O-B Automatic Couplers join securely on impact and *stay* coupled. Contrast this with old-fashioned hitching methods which require a man to guide the heads and make the connection between them.

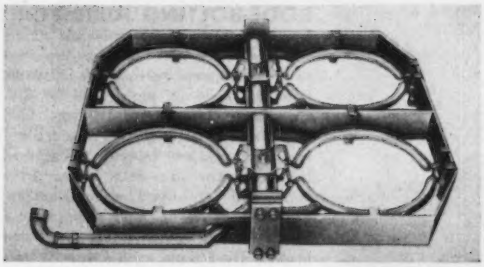
Think of what this means in terms of costs and safety. First, as we've pointed out, less manpower is needed to make up trips. Second, movement of trips is speeded because less time is needed to make them up. Third, a safety hazard is removed when it is no longer necessary for men to enter the "between cars" danger zone.

O-B Automatic Couplers enter the picture whenever there's a demand for quicker, cheaper movement from the face to the tipple. Ask your O-B representative, or write to Ohio Brass Company for more information on automatic coupling for your haulage system.

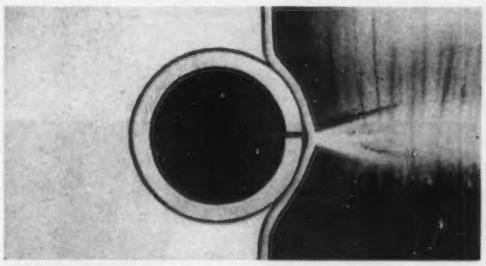
Ohio Brass

MANSFIELD OHIO, U.S.A.

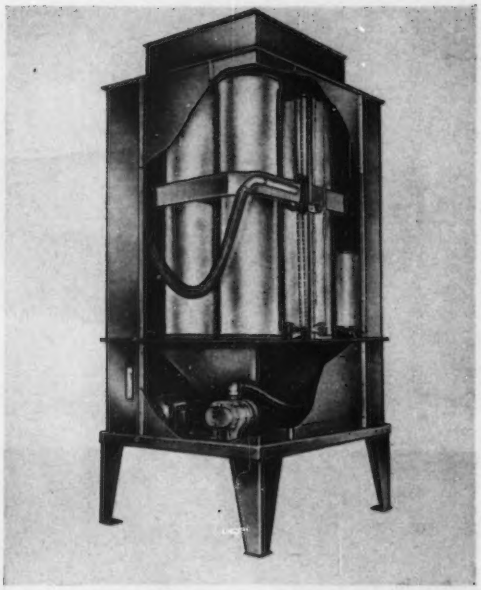
CANADIAN OHIO BRASS CO., LTD., NIAGARA FALLS, ONT.



BLOW-RING ASSEMBLY. Each ring circles filter bag, milks bag with aid of air from inside ring slot.



CROSS-SECTION OF BLOW RING. Air jet and milking action dislodge powder collected in bag (right).

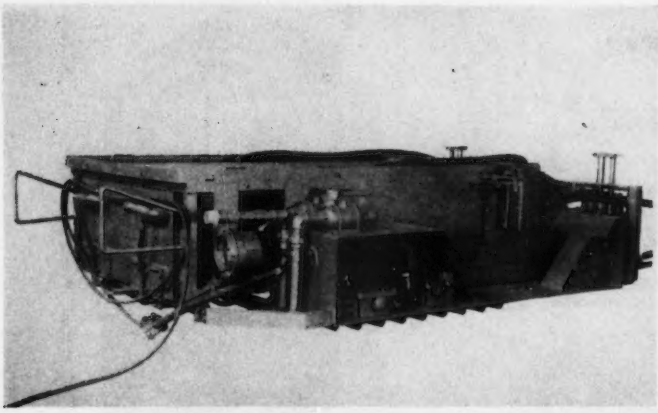


AEROTURN DUST COLLECTOR with panels removed. Dust-laden air enters at top.

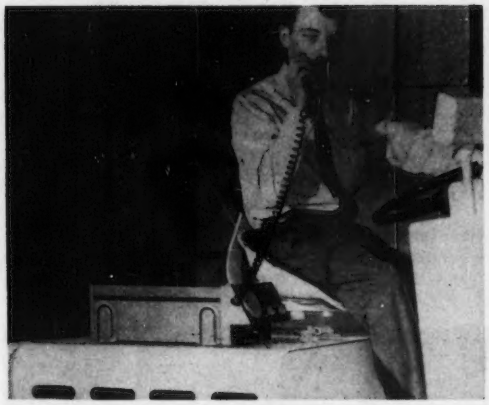
A NEW FEATURE of the Aeroturn Dust Collector is the self-adjusting blow ring. The blow ring consists of two half-circle sections, spring-mounted so they gently press the sides of the bag. From a slot in the ring, high-pressure reverse air dislodges collected powder which falls to hopper below. Turner & Haws Engineering Co. (3)

HUGE FLUID COOLERS above are first of four manufactured by The Trace Co., La Crosse, Wis., to air cool jacket water and lube oil for Liberia Mining Co.'s GM-diesel power units.

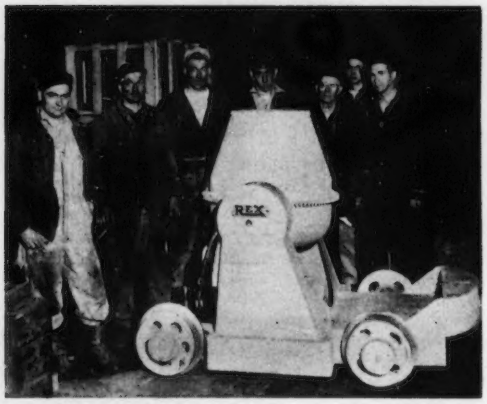
SYNCHRONOUS-MOTOR STATOR FRAMES at GE's large motor and generator department get final round-the-circle inspection. Motors, 100 to 500-hp. will drive compressors, other mineral units. (5)



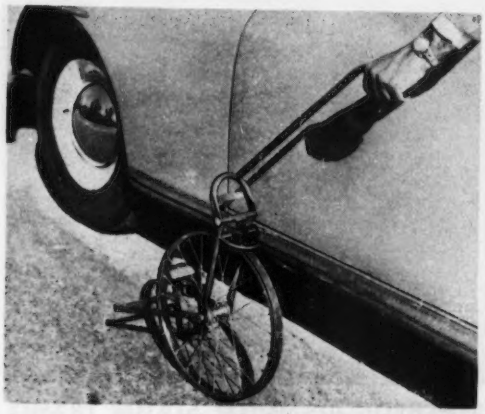
ROOF-BOLTING JUMBO (left) is mounted on permissible electric crawler tractor and is designed to do a complete bolting job in seams from 38 to 58 in. high. Two Le Roi-Cleveland stopers do drilling; feed legs raise dust-collectors to drilling face. Controls are centrally located so that operator can drill holes, drive bolts, and set nuts from one set-up. Crawler moves 3 mph. forward, 1 mph. backward, and turns by tread brakes. Dust from each stoper is collected in a two-stage collection unit; 95% of the fines are deposited in the primary tank, and 5% in a filtered secondary tank. (6)



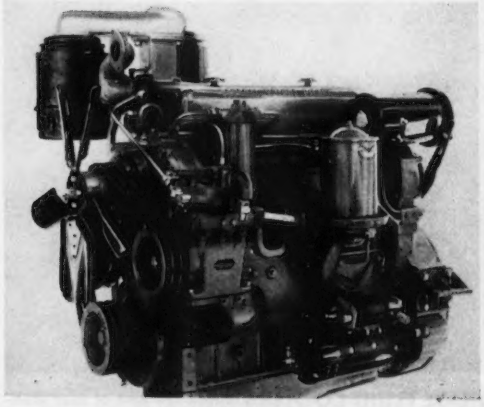
LOW-POWER 2-WAY RADIO was designed by Motorola for industrial use. Unit meets FCC regulations for intra-plant use, can be mounted on lift-trucks and other vehicles. (7)



TRACK-MOUNTED CONCRETE MIXER, Rex 3½S Tilter, is designed for use in underground construction work. Unit above is on 42-in. gauge track. Chain Belt Co., Milwaukee, Wis. (8)



DISTANCE-MEASURING DEVICE called Rolotape is 4 ft. in circumference, measures and records to 100,000 ft. can be folded. Supplants pacing or estimation. (9)



This rugged new **"MILLION-MILER"** diesel engine is a power unit with stepped-up hp., greater fuel economy, in 4-cyl, at 150 bhp., or 6-cyl. at 225 bhp. from GMC. (10)

Equipment Shorts

EXPLOSION-PROOF MOTOR. Ten features, says U. S. Electrical Motors, Los Angeles, Calif., make this new, completely sealed, explosion-proof motor a stand-out. Comes in sizes from 3 to 75 hp. (31)

CARBIDE MILLING CUTTER. When the carbide blades on this new blade-face milling cutter finally get dull, you simply index them to a new cutting edge. You can do that eight times before the blades have to be reground. It's made by Detroit Milling Cutter Co., Farmington, Mich. (32)

PORTABLE GRAVEL PLANTS. Mounted on pneumatic tires, the two new gravel-crushing plants of Pioneer Engineering Works, Minneapolis, Minn., can get around more easily than their weight (over 40,000 lb.) and their completeness would indicate. They are identical except that one uses a 10x24-in. jaw crusher; the other, a 10x24-in. crusher. (33)

GASKETLESS ENGINE. There's no laminated gasket in the new General Motors Series 71 diesel engines. Cylinder head-to-block sealing is taken care of by individual compression ring gaskets around each cylinder and synthetic rubber washers around the oil and water passages. Several other design changes make these 51 to 800-hp. engines really interesting. (34)

CHEMICAL RESPIRATOR. A newly designed facepiece and other improvements feature the new line of USBM-approved chemical cartridge respirators made by Willson Products, Inc., Reading, Pa. Protects against metal fumes, mists, dusts, and industrial gases and vapors. (35)

ULTRA-VIOLET HOLSTER. If you use a Menlo Fluorator in looking for scheelite, or other fluorescent minerals, in the mine or in the plant tailing, you'll be interested in this leather holster that makes the instrument as easy to carry, and to draw, as a Frontier model Colt. Menlo Research Laboratory, Menlo Park, Calif. (36)

NYLON BEARINGS. It may surprise you to know that Nylon makes good bearing material, with or without lubrication. Thomson Industries, Inc., Manhasset, N. Y., has designed a "Nylined" bearing that is said to make good use of Nylon's bearing qualities. (37)

ACID-PROOF JOINT. A spiral wrapping of glass cloth with a resin cement produces the Duro-Joint, a coupling method for Haveg, or other resin-base pipe, developed by Electro Chemical Engineering & Mfg. Co., Emmaus, Pa. The method can also be used to repair broken pipe or to armor porcelain or stoneware. (38)

CARBOY POURING LIP. Special pouring spout fits any carboy, insures even flow of acid content without spurts or splashes. Costs $4.95. Made by General Scientific Equipment Co., Philadelphia, Pa. (39)

FOR FASTER FILTRATION. Designed to give faster flow than previously available Nylon, Dynel, Orlon, or Vinyon fabrics, two new weaves of Cynel made by Filtration Engineers, Inc., Newark, N. J., closely resemble cotton cloths of similar weave in texture and filtering characteristics. (40)

TRACTOR MAINTENANCE. Weld-on plates to make it easy to build up worn tractor track links are recommended by Caterpillar Tractor Co., Peoria, Ill., when wear exceeds ⅝-in. (41)

PICK-UP STICK. Most mine machinery parts are easy to get hold of, but if you've ever dropped a small screw into a slot in a machine, or a radio set, where you can't get at it, or if you want to start a screw into a hole your fingers can't reach, you'll appreciate the Pick-Up Stick, made by Hytron Radio & Electronics Co., Salem, Mass. (42)

HARD-FACING ROD. A medium-priced hard-facing rod for gas welding, with excellent abrasion-resistant qualities, is available from Wall Colmonoy Corp., Detroit, Mich. (43)

ACID-PROOF VALVES. More resistant to corrosion than stainless steel or other metal or alloy valves, a new 1-in. and 2-in. plastic valve is offered by American Agile Corp., Cleveland, Ohio. They come with standard drilled flanges for easy installation. (44)

DRY-ROLLING TOGGLE. Latest modification in design of its "A-1" jaw crusher is the dry-rolling toggle, according to Allis-Chalmers Mfg. Co. Design obviates lubrication; hence cleaner, less costly operation. (45)

RECORDING BAROGRAPH. The new micro recording barograph made by American Paulin System, Los Angeles, Calif., weighs about 30 lb., complete with recording thermometer, charts, and carrying case. It records a pressure curve over a range of 1.00 in. mercury. It can be read to 0.001 in. of mercury, and is said to be of outstanding dependability. Perfected after years of laboratory and field work. (46)

VISE FOR ODD SHAPES. Ever want a vise that would grip a round or tapered object without damaging it in the process? DeWilde-Jones, Inc., San Francisco, Calif., has one they'd like to tell you about. (47)

STEAM TURBINES. A newly-designed line of multi-stage, mechanical-drive turbines in ratings from 200 to 5,000 hp. has been announced by General Electric's turbine department. They can handle about anything in their line from driving pumps to power generation. (48)

USE THIS CONVENIENT CARD

to obtain further information on products and bulletins mentioned in the New Products Digest. Circle item numbers, tear out and mail.

Not good after January 1, 1952, if mailed in U. S. or Canada.

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Please send me the catalogs or further information about the items from New Products Digest whose numbers are circled.

1	8	15	31	38	45	71	78	85
2	9	16	32	39	46	72	79	86
3	10	17	33	40	47	73	80	87
4	11	18	34	41	48	74	81	88
5	12	19	35	42	49	75	82	89
6	13	20	36	43	50	76	83	90
7	14	21	37	44	51	77	84	91

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For Your Files

This informative manufacturers' literature is free unless otherwise specified. To obtain bulletins circle their numbers on card below and mail.

BLOCK SIGNALS. A 6-page bulletin from Nachod & United States Signal Co. describing their Type MS automatic signals for mine haulage ways. Shows typical signal layout for main haulage. Same basic unit is used for all signal applications. (71)

ELECTRIC TRACK SWITCHES. Newly revised bulletins describing latest version time-proved electric track switch for mine use; also methods of automatic, manual, or remote control. From Chentham Electric Switching Device Co. (72)

LIFT TRUCKS. Report 241 of Baker Industrial Truck Div., Cleveland, Ohio, shows how industrial trucks saved time of three men in speeding up carloading and other jobs for Maytag Co. (73)

STORAGE BINS. Here's a pamphlet on storage and loading bins, with sizes, specifications, applications, types of gates to use, etc., from Pioneer Engineering Works, Minneapolis, Minn. (74)

LIFT-TRUCK CARE. Maintenance of industrial trucks is covered in this 16-page bulletin of Baker Industrial Truck Div., Cleveland, Ohio. Shows 51 illustrations of steps to take in preventive maintenance and annual check-ups. (75)

INSTRUMENT SELECTION. How to select electrical measuring instruments is the topic of a 30-page booklet prepared recently by Westinghouse Electric Corp. It explains seven basic factors involved, and works out four selection problems. (76)

VIBRATING SCREENS. Complete new 20-page catalog of wet and dry screening equipment, including information on selection and installation. Link Belt, Chicago, Ill. (77)

BATTERY CHARGER. Bulletin describes a four-circuit motor-generator battery charger that features simplicity and automatic operation. Made by Electric Products Co., Cleveland, Ohio. (78)

THAWING PITS. Unusually complete information on oil or gas-fired thawing pits to aid in rapidly emptying railroad cars in cold weather. Uses radiant heat rather than direct flame contact. Hauck Mfg. Co., Brooklyn, N. Y. (79)

CONVEYOR IDLERS. Contains information on all the latest designs of belt conveyor idlers and related equipment, including specification data. One section deals with maintenance. Chain Belt Co., Milwaukee, Wis. (80)

SHUTTLE CARS. New bulletin describes cable-reel shuttle cars for low headroom entries. Features hydraulically controlled discharge elevation. From Goodman Mfg. Co., Chicago, Ill. (81)

METRIC CONVERSION CHART. A wall chart for rapid conversion of English units to metric units. Shows foot to meters, meters to foot, decimals of a foot. From Mayo Tunnel & Mine Equipment Co., Lancaster, Pa. (82)

RESISTANCE WELDING. A new technical booklet on resistance welding of nickel and high-nickel alloys, including photographs, tables on mechanical properties, chemical composition, etc. From International Nickel Co., New York, N. Y. (83)

CRANE-SHOVEL. New catalog on Model 2000, 25-ton crane and 1¼-yd. shovel. Of special interest to miners is 26-ft. high-lift shovel attachment. Has all the details. From Manitowoc Engineering Works, Manitowoc, Wis. (84)

AIR CYLINDERS. All the data on Rivett air and hydraulic cylinders and valves. Cylinders have special construction that makes them easier to install. From Rivett Lathe & Grinder Co., Boston, Mass. (85)

MANGANESE STEEL PARTS. If you're looking for replacement parts made of manganese steel for shovel, tractor, crusher, etc., you may find them listed in this catalog from Kensington Steel Co., Chicago, Ill. (86)

EARTH-MOVER. Colorful, comprehensive catalog showing profitable ways to use the line of Hough Payloaders in mine and construction work. From Frank G. Hough Co., Libertyville, Ill. (87)

NICKEL PIPING. Technical booklet on fabrication and design of nickel and high-nickel alloy piping. All specification data. International Nickel Co., New York, N. Y. (88)

WELDING LINE CONNECTORS. Joy Mfg. Co., St. Louis, Mo., makes a push-lock connector for feeder cables to welding machines. Won't crack, shatter, become accidentally disconnected. This bulletin describes them. (89)

SQUIRREL-CAGE MOTORS. Allis-Chalmers Mfg. Co., Milwaukee, Wis., has prepared a new bulletin giving all details on their large end-shield bearing squirrel-cage induction motors. They come in sizes up to 1,750 hp. (90)

WELDING ALLOYS. A handy new chart of Eutectic low temperature welding alloys for cast iron, steels, and non-ferrous metal welding, for wall hanging, offered by Eutectic Welding Alloys, Flushing, N. Y. (91)

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to obtain further information on products and bulletins mentioned in the New Products Digest. Circle item numbers on reverse side, tear out and mail.

NEW BOOKS

Clear Writing for Easy Reading. By Norman G. Shidle, editor, writer, and business consultant. Here's a book that's especially recommended for engineers who want to get off to a new and refreshing start in expressing themselves on paper. Mr. Shidle starts out by reminding the reader that the purpose of writing is to get ideas off the printed page and into the reader's mind. And right there he puts his finger on one of the chief faults of writers today—too many are inclined to disregard the reader's absolute right to an easily readable report or article. How do you write for easy reading? Here are a few of Mr. Shidle's hints:

1. Think before you write. If you don't have your ideas clearly in mind, don't write. You'll only succeed in confusing your reader as well as yourself.

2. Get your audience clearly in mind.

3. In any given piece of writing, try to convey one or at least only a few ideas clearly. 'Nuf said.

4. Once you have selected the main idea of your article, keep it moving. Don't get bogged down in a lot of tangential topics. You will loose your reader.

5. Keep your story moving, by: getting rid of say-nothing words, eliminating introductory words, using active verbs, staying clear of qualifying clauses, striving for short sentences, introducing people into your writing, and being specific.

6. Punctuation is merely a device for making things easier to to read. Don't enslave yourself with a lot of academic rules set forth by punctilious grammarians.

7. Put zest and gusto into your writing (yes, even technical writing) by using: artfully-chosen similes or metaphors (but stay away from puns), personalization, appealing to human interest, injecting humor, and using direct quotations. [Editor's note: **The Wall Street Journal**, one of America's best-written daily newspapers, uses these devices regularly to cover lively business topics.]

Published by McGraw-Hill Book Co., 330 West 42nd St., New York 18, N. Y. Pp. 176. Price $3.

Civil Defense in Modern War. By Augustin M. Prentiss, Ph.D., Brigadier General, U.S. Army (retired). A text on the protection of the civil population against atomic, bacterial, and chemical warfare. The author covers this difficult subject in an authoritative, easy-to-read style. After scanning various chapters on bacterial warfare, the hydrogen bomb, effects of air gas attack, etc., we suggest that the sub-title of the book should be "Why War Should Be Outlawed." Even the plants in the field and the cattle on the range will be victims of warfare if the following conclusion of the author is correct—"Our conclusion is, therefore, that we must expect bacterial weapons to appear in future warfare and our civilian population should be prepared for such an eventuality." Nevertheless, civilians cannot afford to shut their eyes to the super-evils of modern warfare. As an educational medium, this book is a valuable contribution to the cause of defense. Published by McGraw-Hill Book Co., 330 West 42 St., New York 18, N.Y. Pp. 429. Price $6.

Silicate Analysis. Second edition by A. W. Groves, Mineral Resources Division, Colonial Geological Surveys, Imperial Institute, London. A manual for geologists and chemists with chapters on check calculations and geochemical data. Published by George Allen & Unwin, Ltd., Ruskin House, 40 Museum St., London, W.C. 1. Pp. 336. Price 25s.

A Mining Engineer's Survey Manual. By J. E. Metcalfe, mining engineer. The author supplements usual basic subjects and information found in survey textbooks with practicable and useful solutions to mine survey problems based largely on examples taken from current literature and the field. Chapter headings include: triangulation; correlation of surface and underground surveys; surveying in inclined shafts, raises, and winzes; underground surveying, general notes; surface surveying, general notes; stope surveying; sampling and valuation; some geologic considerations; modern instruments; the theory of errors; and organization. Published for Mine & Quarry Engineering by Electrical Press, London. Available at Percival Marshall and Co., Ltd., 23 Great Queen St., London WC2. Pp. 341. Price 30s. net.

Conservation of Groundwater. By Harold E. Thomas, U. S. Geological Survey. A survey of the groundwater situation in the United States sponsored by the Conservation Foundation, a non-political organization dedicated to the conservation of the earth's resources. Mining men who are becoming increasingly aware of the fact that water is a vital requirement for the industry will find this over-all coverage of the groundwater resource problem useful and interesting. A large map of the United States is included, showing areas which are underlain by aquifers generally capable of yielding 50 gpm. of water or more to individual wells. Type of aquifers are classified on this map, including water courses, unconsolidated or semi-consolidated aquifers, etc. Among the interesting topics discussed are these: Hydrologic principles and basic data; problems resulting from groundwater development and use; our increasing requirements for water; problems of water rights (legal concepts); better groundwater management. A selected bibliography is included. Published by McGraw-Hill Book Co., 330 West 42 St., New York 18, N. Y. Pp. 327, including three maps. Price $9.

Tacheometry. By F. A. Redmond, professor of civil engineering, University of Hong Kong. A fine textbook on the subject of tacheometry (more commonly known to American engineers as stadia surveying) which covers these topics: stadia surveying, use of the inclined staff, instruments, errors, field work, office work, stadia plane-tabling, subtense measurement, tangential measurement, and special instruments. The author is well known for his previous book, "Tacheometric Tables." Published by The Technical Press, Ltd., Gloucester Road, Kingston Hill, Surrey, England. Pp. 248. Price 21s. net.

Practical Oil Geology. Revised Sixth Edition by Dorsey Hager, consulting geologist and petroleum engineer. The new edition of this well-known text contains new data on tectonics, modern well-logging methods, well sampling, and a separate section on Veatch's Rule (a method of predicting the number of new oil fields to be discovered on the basis of size of producing fields and unproved areas in sedimentary provinces). The text also includes a map of deep basins of the United States favorable for gas and oil exploration. Published by McGraw-Hill Book Co., 330 West 42 St., New York 18, N.Y. Pp. 589. Price $7.50.

Frontiers of Personnel Administration. A Columbia industrial report, published by the Department of Industrial Engineering, Columbia University, New York, N. Y., based on the 1951 Conference on Industrial Personnel. Some fifty members of industry, educational institutions, and industrial engineering firms participated in this conference which yielded a collection of useful papers on personnel problems including titles like these: "Executive and Supervisory Training and Development;" "Communications and Personnel;" "Worker Participation on Production Problems;" "The Budgeting of Industrial Personnel;" and "Personnel and the Community." A bibliography listing over 1,000 books and articles concludes the volume. Pp. 150. Price $12.50.

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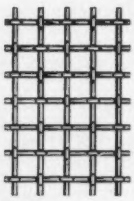

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MINE ROOF SUPPORT BOLTS

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Magnetic Separation

(*Continued from page 83*)

for use as raw material for iron powder. This opens up interesting possibilities, as the only source hitherto which was clean enough for such use has been mill scale. The available tonnage of magnetite concentrates of the same type as those tested is of the order of 500,000 tons a year. The scarcity of ore today, however, might make it hard to make any tonnage available for other than blast furnace use.

Two magnetic taconites from Babbitt and Aurora were also tested. The iron content in the concentrate after 3-phase separation was 66% and 64% respectively. The intimate intergrowth of iron oxide and gangue in these ores make it impossible to obtain purer concentrates than those shown.

The yield of iron in all the described separation tests was above 98%. It might be possible with other apparatus to obtain similar high-grade concentrates but only by using weak fields, in which case recovery would be reduced.

The separation of the magnetite concentrate from Bondgruvan, Sweden, is an example where the concentrate is not sufficiently ground before separation. The figure for iron content in the tailing represents that of the mixture of middling and tailing. The tailing thus consists in part of mixed grains that could be reground.

The 3-phase separator is commercially used today for the magnetic separation of iron powder. The separation problem here is extremely difficult as it is one of removing very minute percentages of gangue from the highly magnetic powder. Usually the powder before separation contains 0.5% silica which has to be brought down to around 0.2%. This is impossible to do with normal drum separators where the nonmagnetic particles are completely entrapped in the clusters formed by the iron powder in the dc magnetic field.

The 3-phase separator will have its greatest use as a super-concentrator, where it is a question of cleaning to a high degree concentrates produced by other machines. As the separators have no moving parts, a whole battery of them can be installed with no need for inspection 24 hr. a day. The power consumption is relatively low and the main cost would therefore be capital and construction.

REFERENCES

[1] *O. A. Zander*: Swedish Patent No. 31780, 1910 and 35220, 1912.

[2] *W. M. Mordey*: The concentration of minerals by means of alternate electric currents. Mining Magazine, Vol. 26, June 1922, p. 333-343.

[3] *R. S. Dean and C. W. Davis*: Magnetic Concentration of Ores. AIME Transactions, Vol. 112, 1934, p. 509-537.

[4] *C. W. Davis*: Alternating current magnetic separation of iron ores. Bureau of Mines, Rep. of Investigation 3229, 1934, p. 35-37.

[5] *R. S. Dean and C. W. Davis*: Magnetic Separation of Ores. U. S. Bureau of Mines, Bulletin 425, 1941, 417 pages.

[6] *E. W. Schilling and H. Johnson:* Separation of hematite by hysteretic repulsion. AIME T. P. 654, Dec. 1935.

[7] *B. Granigg*: On the Principles of Magnetic Concentration. Metall und Erz, Vol. 36, 1939, p. 259-261.

[8] *B. Granigg*: New Laboratory Equipment for Magnetic Concentration. Metall und Erz, Vol. 37, 1940, p. 425-432.

[9] *K. Sittig*: Experiments with magnetic separation of low-grade American iron ores. Doctor Thesis, Technical University, Berlin, 1933.

[10] *R. E. Buehl, E. P. Shoub and J. P. Riott*: Control of sulphur content of sponge iron produced in rotary kilns. U. S. Bureau of Mines, Rep. of Investigation 4057, 1947.

[11] *S. G. H. Eketorp and V. H. Varming*: Swedish Patent 120710, 1944.

[12] *S. Eketorp*: Discussion on paper by S. Mortsell. Jernkontorets Annaler, Vol. 130, 1946, p. 467-470.

[13] *S. Eketorp*: Magnetic Separation of Minerals. Canadian Metals, Vol. 13, No. 3, p. 6-9, 46-47.

[14] *S. Mortsell*: Comparative tests with Different Separation Equipment for Magnetic Analysis. Jernkontorets Annaler, Vol. 134, No. 12, 1950, p. 572-581.

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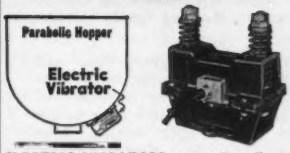
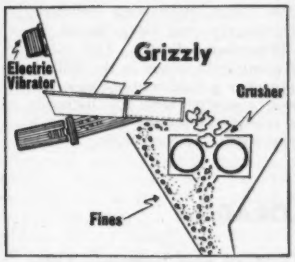
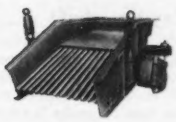
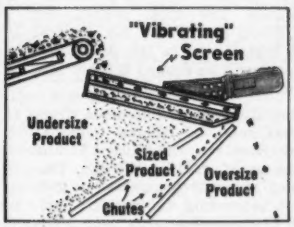


ELECTRIC VIBRATORS assure free flowing bins, hoppers and chutes; break down arching and plugging of materials.





VIBRATING GRIZZLIES both feed and scalp in one operation at controlled rates of flow.



VIBRATING SCREENS screen material wet or dry with single or multiple decks; used to size the product.

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Potash Content by Geiger Counter

(*Continued from page 91*)

Furthermore, the following is to be considered when judging these results:

1. Inasmuch as we compared the analytical results with the Geiger-Müller counts, every deviation from the average curve can be caused in the same degree by errors in the gravimetrical analysis and in the radioactive method. The analytical methods we used were sintering of the slurry after the Lawrence Smith method, dissolving the clinker in hydrochloric acid and digesting with acetic acid, respectively. In the respective filtrates the potassium platinum chloride was precipitated as usual, washed with alcohol, dissolved in hot water on the filter and reduced to platinum by magnesium.

Deviations of the found potash values from the true content ought to be considerably smaller in reality than the errors given above, where it had to be assumed that the analytical results were right, since the true K_2O content of the sample is not known.

2. Part of the errors in clinker and slurry may also be caused by variations of the radioactive background of these materials.

The precision of the method for higher potash contents can be seen from Table 1. The small number of measurements of potash dust that were compared with gravimetrical analyses are also listed in this table. For these results what has previously been said for the low percentage applies, yet no other radioactive substances seem to be present in the dust.

Can Shorten Time

The time necessary for each test has been determined empirically from a practical standpoint in such a way that, when a prolongation of the measuring time did not change the decimals of the count per minute essentially, this was taken as normal testing time. Even with the sensitiveness of our present apparatus the testing time can be shortened if a rapid determination of the variations in the flue dust is desired. The precision will be somewhat less, but sufficient for the purpose.

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 (Continued from page 102)

IN THE UNITED STATES

ARIZONA

★**American Asbestos Cement Corp.** expects to complete a $75,000, 5-ton-per-day mill at its Gila County mines by December 1. The corporation has been authorized for a $123,869 government loan for initial survey and drilling. More than 18,000 ft. of drilling is planned in 2,000 acres of deposits.

CALIFORNIA

Cordero explores New Almaden—Copper strike at Copperopolis

★**Cordero Mining Co.** has leased the historic New Almaden quicksilver mine near San Jose, Santa Clara County, and plans are nearing completion for diamond drilling areas recommended by the U. S. Geological Survey. About 9,000 ft. of drilling is involved, all BX holes, half of which will be done from the surface on Church and Cemetery Hill, and the other half underground on the Day tunnel horizon. Rehabilitation of the Day tunnel is in progress. The work is being done under a government exploration loan. The New Almaden property, which includes the New Almaden, Enriqueta, Senator and several other workings, covers about 4,359 acres and extends along the Los Capitancillos Ridge in the northwest direction for some 4½ mi. (It was operated during World War II by the New Almaden Corp.) S. H. Williston is vice president of Cordero; J. Eldon Gilbert, general manager; and Bert Mitchell, superintendent.

★**Operation on a new copper strike,** at the Donner Mine near Copperopolis, Calaveras County, is underway by **Ronnie B. Smith, Dallas, Texas.** Completed to date is a 2-compartment shaft 100 ft. deep sunk on a vein 16½ ft. in width assaying 3.85% copper and 7.8% zinc. The ore is similar in character to that of the nearby Penn Mine, and consists of sulphide replacements in veins and lenses in metamorphosed sedimentary igneous rocks. The principal copper minerals are bornite, chalcopyrite and chalcocite occurring in a streak 30 in. wide. Ore shipments are being made to American Smelting & Refining Co.'s Tacoma, Wash., plant. Smith has leased the Mountain King mill near Copperopolis and expects to operate the mill making separate zinc-sulphide and copper-sulphide concentrates. Roy G. Mead, Glendale, is in charge of operations. Howard Castle is mine foreman.

★**W. B. Barton, Eugene, Ore., and John Johnson, Del Norte,** have completed negotiations for **purchase of the Robert Sarina chrome mine** in the Hole in the Ground section, near Crescent City, Del Norte County. Equipment and machinery will be brought in to remove overburden and build roads to the property.

★**Willow Creek Mine** near Hildreth, Madera County, has been **leased by Guy Richardson, Friant.** The mine, one of many gold mines in the Millerton area over a half century ago, has not been operated recently. Richardson is reported planning to set up a mill sometime in November.

Truck Moves Bunkhouses to Scheelite

THE SITUATION: Near Bishop, California, **U. S. Vanadium Co.** needed more bunkhouses at Scheelite, had an excess at the "A" level, 4,000 ft. higher in elevation, and connected to Scheelite by means of a narrow switchback road.

THE PROBLEM: How to move the approximately 30x30 ft. houses down the road, which had insufficient clearance and was coursed by strong thermal winds.

THE SOLUTION: Each building was cut into four 15-ft. sections. **R. J. Goulet Construction Co.,** of Bishop, cruised the road noting road clearances with a truck and semi-trailer, on which was mounted a frame the same size as each building section. In places, the inner track of the roadbed was built up to allow the building to pass. Then a section of the building (as shown above) was mounted on the trailer. Ballasted with chunks of concrete on the light side, it was hauled carefully down to Scheelite, where sections were re-assembled into bunkhouses for U. S. Vanadium Co.'s tungsten miners.

COLORADO

AEC offers new bonus—Tunnel hits Hayden shaft

★**Front Range Mines, Inc.,** reports high-grade gold ore shipments from the Strong Mine. This Cripple Creek mine at Victor has recently produced over $100,000 from a rich strike. After extensive repairs to the mine, the company is now making regular shipments to the new Golden Cycle mill. The first of these shipments, approximately 250 tons, settled for $72.80, $73.85 and $77 per ton. Several lots in transit and in the process of settlement will be around $80 per ton. More miners are needed.

★During July, four shipments from the **Ajax mine of Golden Cycle** at Cripple Creek ran 1.46, 1.01, 1.71 and 1.07 ounces of gold to the ton. One shipment ran 6.39½ ounces of gold per ton. According to Charles Carlton, all of these shipments were made from the Bob Tail vein on the 27th and 28th levels.

★Work on the **building of a mill at the Jumbo mine** at Breckenridge is progressing. The Jumbo has good ore and in the course of further development may encounter the streaks of high-grade gold for which Gibson Hill is famous. The operation will probably be in full swing before fall so that a large crew can be working at the Jumbo during the winter months.

★At the **Gold King mine** at Cripple Creek, J. Ahearn, Hereford Pfeiffer, and Bill Rader **have put down four**

drill holes from the tenth level in the direction of the main vein. They have gotten some encouraging assays. The holes are all between 150 and 160 ft. deep. The company is also driving a crosscut on No. 10 level which has been showing some good values.

★**A new bonus offer** is being made by the **U. S. Atomic Energy Commission** as a prize to uranium miners to speed the production of atomic ore. The bonus to be paid producers on Colorado Plateau is under the new plan. AEC will pay up to $3.50 per pound for the first 10,000 lb. of uranium from a new mining operation, if it qualifies for the bonus. That means a possible bonus of up to $35,000 per certificate. Miners qualifying for the new bonus receive payment for the ore when they sell it, 6¢ per ton mile haulage. a development allowance, plus (in some cases) a premium for higher-grade ores. AEC officials state that most of those filing bonus claims so far have had production prior to March 1 this year when the bonus became effective. That means they must deduct all production before March 1 from the 10,000-lb. maximum per certificate. AEC will pay its bonus only on the balance. Some miners don't ship $3.50 ore. Ore must be 20% or more uranium to get the maximum, but a lot of 15% ore is also shipped. The bonus on 10,000 lb. of 15% ore is $25,000.

★Work is in full swing at the **Superior mine** at Montezuma with a dozer and shovel clearing the ground for the **new tunnel** location. Those acquainted with this property are confident of success as the vein encountered in the upper tunnel was one of the best and strongest in the district.

★The ninth and tenth gold bricks have been poured at the new Carlton mill of **Golden Cycle Corp.** in the Cripple Creek district; it is reported to be receiving 600 tons of ore daily. The crushing and sampling department is operating 10 hr. a day (instead of 8 hr. as formerly), 6 days a week. The approximate value of the two bricks is said to have been between $40,000 and $45,000. About $350,000 worth of ore has been purchased since the mill opened. Though first shipments ran between 300 and 400 tons per day, the average is now 600 tons.

★H. C. Kenyon, owner of the Kenyon Iron Works of Denver went up to Breckenridge to inspect work at the **General Teller** and to assist in moving equipment to the mine. He installed a 5,000-gal. oil tank and also delivered a supply of new pipe for use in the operation. **Contractors** who have been hired to sink the shaft at the General Teller have started work.

★Fred Brooks says that the **Allen Emery mine** at Montezuma is **shipping 100 tons of ore weekly** to the Leadville mill. Brooks and his partner, Herbert T. Young, struck a good vein of lead, zinc and silver from 2½ to 4 ft. wide. Mr. Brooks stated that a

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Cutaway view of a typical cell used in batteries for mine haulage. High-strength steel construction is used in all cells.

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STORAGE BATTERIES

Colorado *(Continued)*

bulldozer recently broke ground for a new mill in Montezuma.

★This year **Breckenridge** has a new operation at the Wellington mine under the direction of Dave Davenport, Harold Horn and Marvin Murger. For several years, production has been well in excess of $100,000 and now with the installation of electrical equipment and other new machinery, production will be increased. The work at the Wellington has been done through the Mule Tunnel, with a crosscut to the north cutting all the well-known veins of Mineral Hill. A shaft is now contemplated for the Wellington that will permit the development of all veins recently encountered at greater depth, and will allow for stoping back to the present tunnel level.

★**Merrill Shoup**, president of the Golden Cycle Corp, has been **in Washington** working with the Wage Stabilization Board to try to establish a base rate of pay for the Cripple Creek area and grant the local mining companies permission to raise the rate of pay. The basic date of the wage schedule was Jan. 25, 1951, when the mines and mill were not working and there was no established base rate of pay for the area. According to Shoup, when the raise in pay is granted by the board, the companies plan to make the increase retroactive to June 1 of this year. It is reported that the increase sought will be 10¢ an hour for underground men.

★At the head of the Blue River in Summit County, the **Empire Zinc Co.** is engaged in **diamond drilling** operations on the properties of the Middlesex Mining Co. and the H. F. Hartwell group, which includes the Monte Cristo. J. H. Kennedy proved these properties during the past several years by shipping several hundred tons of ore from surface operations. Empire Zinc Co. has the properties under option.

★At Grand Junction, the U. S. Department of Interior has advised the Atomic Energy Commission that, in accordance with a request from the Commission, it has withdrawn from mineral entry for use of the AEC approximately **66 sq. mi. in Grand County**, Utah. This withdrawal is described in Public Land Order 745. The new area withdrawn by Public Land Order 745 will be subject to study and test by diamond drilling as a part of the Commission's program of exploration for uranium-bearing ores.

★The historic **Roosevelt mine** on Quartz Creek near Ohio City and Pitkin has been sold to the **Poston Mining Company** of Canon City; Warren G. Poston of the purchasing firm said that **operations will begin at once.** The Postons also operate the nearby Brown Derby mine on lease and hold

mining interests at Cotapaxi and Cripple Creek.

★A lateral of the **Leadville drainage tunnel** was holed through into the Hayden shaft. A 27-ft. drill hole hit the shaft "on the nose," and drained some 50 ft. of water standing in the shaft. Rate of water flow from the main tunnel has decreased from 3,600 gpm. to 3,200 gpm., and work will be resumed on the main tunnel as soon as the lateral is completed. The tunnel heading is only 400 ft. or so short of the current objective, the Robert Emmet shaft.

IDAHO

New company organized to exploit claim groups near Mullan — Atlas group acquires more claims.

★A new mining company, **Silver Valley Lead Mines**, is being formed in Wallace with a capitalization of $500,000 to take over an area of mineral territory east of Mullan extending 3 mi. from the Vindicator mining claims to Pottsville. **Sullivan Mining Co.** (subsidiary to Bunker Hill and Hecla) plans to finance new deep development work at some central point along the mineral belt involved, retaining 85% of the net smelter returns from any ore produced until its capital investment is returned and will operate on a 50-50 basis thereafter. The mining companies and property owners so far involved include the Idaho Silver, with 11 patented and 8 unpatented mining claims; the O'Brian Gulch Silver-Lead company, with 26 unpatented claims; the Lucky Boy group (owned by Bunker Hill), 36 unpatented claims; the Snowstorm-Coughlan group, 29 unpatented claims; the Hibernia Silver-Lead group, 25 unpatented claims; the Worthington Ranch Homestead (mineral rights owned by Hecla Mining Co.), Hendrickson Ranch Homestead; Lindroos Ranch Homestead; and mineral rights under the Hale Fish Hatchery. Negotiations are in progress involving other property in the area. The mineral belt involved follows along the north side of the Osburn Fault structure.

★The H. J. Hull law firm in Wallace, acting for an undisclosed client, has organized the **Cortez Silver-Lead** corporation with a capital stock of $150,000, to operate in the same territory, but no disclosures have been made as to what companies or property are involved.

★**Lucky Friday Silver-Lead Mining Co.** has purchased a nine-tenths interest in the mineral rights on the 160-acre Jutila Homestead tract east of Mullan, together with an adjoining tract of 10 to 15 acres from Waino

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Idaho *(Continued)*

and Henry Jutila. The easterly strike of the Lucky Friday vein system trends toward this ranch property. On the 2,000-ft. level, Lucky Friday has driven a short crosscut north to provide car storage and is now drifting south at the rate of 10 ft. per day to open the vein system, which exposes high-grade ore in separate veins on the 1,800-ft. level about 75 ft. apart. The company had started shipping a 4,000-ton stockpile of ore to the Golconda custom mill and had produced one carload of concentrates when the present labor strike closed the milling plant.

★**Rhode Island Mining Co.**, with property in Terror Gulch in the evolution district east of Kellogg, has obtained a government loan of $12,500, half of a $25,000 project for prospecting by diamond drilling. Vivian Brothers of Kellogg have started drilling operations.

★**Defense Minerals Administration** has loaned Sunset Minerals Co., in the Pine Creek area, funds to help finance a $63,725 project to prospect the Liberal King vein.

★**Sidney Mining Co.**, in the Pine Creek area, has opened its vein system on the 1,100-ft. level, where it exposes a 14-ft. width of zinc-lead ore of higher grade than in upper levels.

★**Silver Banner Mining Co.** (subsidiary of Coronado Copper Co., California), organized to develop the Moe group near Mullan, has filed amended articles of incorporation with the county recorder reducing its capital stock value from $500,000 to $50,000, reducing the par value of its shares from 10¢ to 1¢. The amended articles state it is the purpose of the company to develop the Moe, Troy, Gold Creek, Arnold and Gem State groups of mining claims and any other groups that may be acquired within 3,000 ft. of the Moe property.

★**Hecla Mining Co., in cooperation with Newmont, New Jersey Zinc, and Atlas**, has enlarged the Atlas Horseshoe tunnel for a distance of 10,000 ft. and equipped it with heavy rail. The mine dump is being raised 4 ft. and a new hoist station is being cut at the shaft station. New hoisting machinery is being installed preparatory to sinking the 3-compartment Atlas shaft from the present 800-ft. level to the 2,400.

★The latest development in the **Hecla - Newmont - New Jersey - Atlas** $1-million mine development program at Mullan is in the purchase of the Banner-Idaho property of five patented claims just south of the Atlas group in the Boulder Creek area. The companies have also purchased the old Amazon-Dixie property covering a large territory just east of the Idaho-Montana state line. This property contains several patented and

a number of newly located unpatented claims. It adjoins the Reindeer-Queen group, which is also owned by Hecla interests and will no doubt eventually be included in the vast territory controlled by the companies mentioned. The Reindeer-Queen has extensive mineral showings, which have been partially developed at shallow depth.

★**The old Empire copper mine** near McKay, Idaho, has been purchased by United Engineers, Inc., of Boise, from the McKay Exploration Co. for a consideration of $25,000 with payments to extend over a period of 10 years with a 10% royalty to apply on the contract. The mine, once owned by the Empire Copper company, was a large producer of copper ore, and operated a smelting plant at McKay.

★**Sun Valley Lead-Silver Mines, Inc.,** operating near Hailey, has opened a 14-ft. width of good milling grade silver-lead ore for a distance of 100 ft. in length, according to Ross Roundy, president and manager. The strike was made on the Blue Kitten claim.

★A Piper super cruiser **plane equipped with a radioactivity detector** (Scintillometer) is being used by **J. R. Simplot** of Idaho to locate claims. The detector in the plane, which flies at an altitude of about 100 ft., indicates locations for further exploration on the ground. The combination of air and ground exploration has led Simplot to stake out more than 1,000 claims, most of them in Utah, since his air-prospecting started last October. In searching for radioactive minerals, the pilot and engineer base their estimates on the way the detector reacts over a new field after standardization on a mineral area of known intensity. The plane has been flown in Idaho and other inter-mountain states, as well as Utah. First quest was for uranium; now Simplot is sending the plane up to search for other promising deposits.

IRON COUNTRY

Hanna to develop Bengal-Tully. Iron discovered at Kettle River.

MICHIGAN

★**Geological exploration projects at Calumet & Hecla Consolidated have been approved** by DMA. The estimated cost is $586,000, half of which is to be borne by the federal government and the other half by the company.

Several thousand feet of surface drifting or trenching will be done, mostly in Keweenaw County; a construction company has been engaged to do the work. Geologists of the com-

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Iron Country *(Continued)*

pany have mapped out the most favorable areas.

The proposed underground exploration will consist of two drifts driven south of the present Centennial property; one drift north of Seneca to further explore the Kearsarge lode; and drifts north and south on the Iroquois vein.

The projects will take about two years to complete. They are part of the government's program to locate commercial reserves of copper.

★Although the RFC has rejected a loan application by the **Copper Range Co.** for development of the White Pine property in Ontonagon County, the company still expects to get government assistance for the project. Application has now been made to the Defense Materials Procurement Agency (DMPA). Copper Range officials are meeting with officers of the agency to work out the provisions of a loan contract. This will assure repayment to the government and at the same time be flexible enough to permit continued operation by the company, irrespective of price fluctuations in the years ahead.

★**Work is progressing on the pilot plant at the Groveland mine** of **The M. A. Hanna Co.** near Randville in Dickinson County. The mine shipped 156,032 tons between 1901 and 1913, has been inactive since then. It was worked through a 200-ft. shaft. It is now planned as an open-pit operation, if the pilot plant tests are satisfactory. The plant is the first of its kind for treatment of low-grade ores in the Upper Peninsula.

★The Permanent Construction Co., Milwaukee, Wis., has received a **contract from the Jones & Laughlin Ore Co.** for the erection of an **engine house at the Tracy mine** with all equipment installed and prepared for operation. It was designed by the Worden-Allen Co., Milwaukee, who also designed and erected the shaft headframe. Engine house equipment will include two 12-ft. drum hoists. The ore hoist will be provided with two 1,250-hp. motors and the man hoist will have a 750-hp. motor. Air for underground work will be supplied by two 2,500-cfm. compressors. A carbon-monoxide detector and alarm will be installed between the compressors and the receiving tank to prevent any carbon monoxide being forced into underground workings. All the equipment will have the latest and best safety devices. A 30-ton overhead crane will be used for handling and setting the heavy machinery and will remain as part of the permanent equipment.

★The **Inland Steel Co.** has submitted to its stockholders **a plan** which would permit all **employees** who have been with the company two years or more to **buy Inland stock.** If approved by the stockholders and the interested

government bodies, the payroll saving plan under which employees could accumulate money at interest to buy stock set aside for them, will affect about 18,000 of Inland's 25,000 employees. The same percentage of earnings allowed for such investments will apply to all employees. Price of stock will be 85% of market price on date the plan becomes effective.

★With ore from the Gogebic and Marquette ranges being added to the usual Menominee Range shipments at its docks, **Escanaba may set an all-time record** this season for tonnage of ore shipped. Shipments from the port as of August 1 were one million tons over last year's. Shipments from Ashland, Wis., docks, on the contrary, were about one-half those of 1950. Total shipments from Lake Superior ports as of Aug. 20 were 54,073,126 tons—over 12,000,000 tons ahead of that date in 1950.

★Work has been begun by the **Cleveland Cliffs Iron Co.** on **reopening the Ohio mine property**, 2 mi. west of Michigame in Baraga County. The Ohio, to be operated as an open pit, was opened in 1907 as an underground mine and operations were continued through 1920 with a total production of 477,803 tons. It is planned to operate the smaller Webster mine—owned jointly by the Cleveland Cliffs Iron Co. and Pickands Mather & Co.—in conjunction with the Ohio.

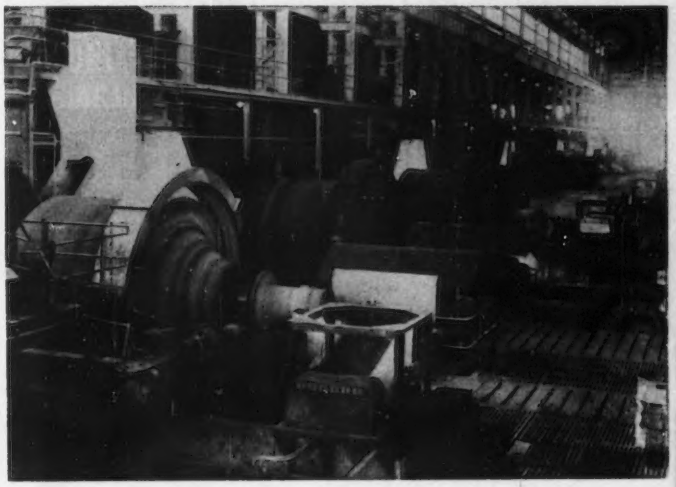
★H. L. Pierce, **M. A. Hanna Co.**'s vice president in charge of mining, announced that "several million dollars" would be expended for the full development of the Bengal-Tully property in Stambaugh. Work has been started on a new shaft which will be called the "Cannon Shaft" in honor of G. M. Cannon, retired manager of Michigan mines. Shaft sinking will require two years. Plans approved by the Cleveland office provide for a complete new surface plant which will equal anything in Michigan, Mr. Pierce said. The property is expected to be Iron County's leading producer when fully developed.

MINNESOTA

★Hibbing is now a district office of the **Western-Knapp Engineering Co.** The North Central District will include Michigan, Minnesota, Iowa and Wisconsin. **Warren Howes**, formerly chief engineer at Hibbing, is district manager; and **Abe Mathews, Jr.** is chief engineer. **Kenneth Troumbly, Charles H. Reeve** and **H. F. Swanson** have been added to the engineering force at Hibbing. The increased tonnages of low-grade ore being mined and the develoments in taconite concentration have greatly expanded Western-Knapp Engineering Co.'s activities on the Mesabi range.

★The 1950 report of **St. Louis County** mine inspector, **A. F. Benson**, gives much interesting information. From

MUFULIRA SAVES BALLS, LINERS AND POWER WITH CONICAL MILLS



Eleven 10' x 72" Hardinge Mills in a plant of the Mufulira Copper Mines, Ltd., Mufulira, Northern Rhodesia.

At Mufulria Copper Mines, Ltd., Northern Rhodesia, Africa, eleven large Hardinge Conical Mills are grinding away at the copper ore, and two more Hardinge Mills of the same size will shortly be added.

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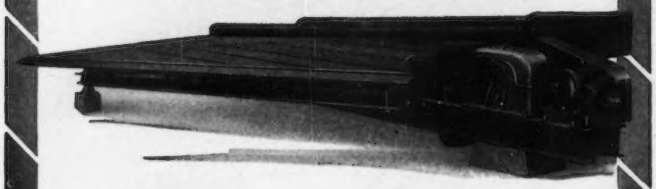

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Iron Country *(Continued)*

a total of 74 **open-pit** and 10 **underground mines, 45,498,990 tons of pit and 3,172,976 tons of underground ore** was shipped. This would make an average open-pit mine shipment of 710,922 tons as compared to a 317,298 tons average from underground properties. The Sherman group, Hull-Rust group and Rouchleau pit of the Oliver Iron Mining Co. were the three largest producers in the country. Each made shipments of more than five million tons. Oliver's Mountain Iron pit, Pickands Mather & Co.'s Mahoning and Oliver's Gilbert pit—all with shipments exceeding 2 million tons—followed in that order. A total of 52,686,635 cu. yd. of stripping was moved from county mines during the year. The Sherman group headed the list with 9,955,510 cu. yd. and the Morton of The M. A. Hanna Co., where a big dragline operates, was second at 4,537,558 cu. yd.

★**The Hansand Steamship Co.** (M. A. Hanna) has acquired a **C-4 vessel** from the Maritime Administration which will be lengthened and converted for **ore haulage** on the Great Lakes. It is expected to be ready for the 1952 season.

★**The M. A. Hanna Company's long-range exploration program** now includes drilling in Aitkin, Otter Tail, and Becker counties of Minnesota. Drilling in the Rice River area of Aitkin County has been in progress for the past year and a half.

★The **Jennison Mine of The M. A. Hanna Co.**, which adjoins its Buckeye mine on the north, is being operated in connection with the Buckeye. Stripping was begun at the Jennison last winter and first ore shipments were made this season. The Buckeye and Jennison operations now cover seven forties. More than 4 million tons of ore have been shipped from the property since it was opened up by the Evergreen Mining Co. in 1943.

★**Eight new 34-ton Euclid trucks** have been received at the Perry mine of **The M. A. Hanna Co.** and are in operation. The 9 W. dragline has been moved from the Perry to the new Carlz mine, where it is now at work. A new 2½-cu. yd. diesel shovel has been delivered at the South Agnew mine. The Sec. 6 mine on the Cuyuna Range shipped its first ore on July 27.

★**The Inter-State Iron Co. will reopen the Greenway mine** and begin development of its Lind mine this fall or winter. The properties are about 5 mi. west of Grand Rapids and contain an estimated combined tonnage of 5,384,964 tons. A concentration plant will be built on the Greenway side of the Prairie River, which will be bridged to permit hauling ore from the Lind to the plant on the west side of the river. Shipments are scheduled to begin in 1953. The Greenway was operated by the Evergreen Mining Co. from 1940 to 1944.

★The Minnesota State Executive Council on August 20, awarded permits to 14 mining firms and individuals to prospect for iron ore on 87 state-owned parcels of land on the Minnesota iron ranges. About 150 were received. It was the biggest sale in state history with the highest prices in the bidding. Seventy-seven of the properties are undeveloped, according to Ray Nolan, director of the state lands and minerals division, and only 11 of the units contain a known tonnage of iron ore.

Under the present Minnesota law, passed by the last legislature, the minimum royalty on underground ore is 15¢ for 25% ore and 45¢ for 57% ore. Open-pit ore calls for 18¢ for 25% ore and 86¢ for 57% direct ore.

★**The Hallock Construction Co.**, which operates many sand and gravel properties in various localities, is **stripping the Jessie mine** near Grand Rapids. This property has been known as the Remer Reserve. It is southeast of Inter-State's Lind mine and contains an estimated 2,344,056 tons.

★**A discovery of iron ore is reported at Kettle River**, about 40 mi. southwest of Duluth in Carlton County. William Ketcheson, Moose Lake, says that preliminary drilling has shown the iron ore deposit starts at 17 ft. below surface and extends to well over 200 ft. He already has some 3,200 acres of land under option and says, "I wouldn't be leasing that kind of land if there wasn't any ore. There's plenty of it." It is reported that speculators and mining companies are competing to buy up mineral rights. Some 40-acre tracts are rumored to have brought $90,000, while many farmers are being offered options that promise to pay up to $20,000 for a forty. (Options run 70 years, are held by a small down payment with the balance to be paid when and if the ore pays off.) No actual mining operations will be begun until a lot more prospecting is completed. Mr. Ketcheson is reported to have said that a large Toledo, Ohio, mining firm will develop his property on a royalty basis.

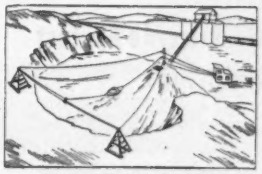
★**The Cleveland Cliffs Iron Co. will build a Mobil-Mill** west of Holman, across from the Taconite road junction. It will be used to concentrate the lean ore stockpiles nearby. Western-Knapp Construction Co., Hibbing, has a contract for the job. Grading has already been started.

MONTANA

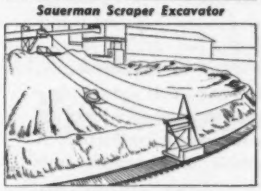
Harvey Machine loan gets further study—Chrome plant may be built.

★**Brown Lake Tungsten Co.**, a mining partnership with properties near Melrose, south of Butte, has been granted a government loan to develop and ex-

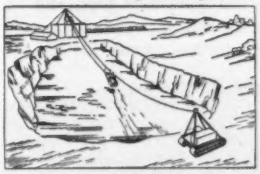
Sauerman Scraper stores and reclaims 150,000 tons of stone on dock at cement mill.



Sauerman Scraper Excavator



Sauerman Scraper Stockpiler



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Drag Scraper Stockpiler—For bulk storage, Sauerman engineers have developed a series of drag scraper machines that make storing and reclaiming an easy one-man job. These machines are giving satisfaction in handling such diverse materials as coal, concrete aggregate, ore, salt, sugar, fertilizers, etc., both indoors and in the open.

Slackline Cableway Excavator — This unique machine has no equal for work that requires digging deep and far and conveying to a high delivery point. In a wet gravel pit, for instance, it reaches under water, comes up with a heaping load of gravel, and lifts its load to the top of the plant, delivering thirty to forty loads an hour.

Tower Excavator—This is a self-propelled drag scraper machine with a high tower at the head end carrying the scraper hoist and a low tower at the tail end. Towers are mounted either on crawlers or on swivel trucks and move along in unison under control of the scraper operator. This machine's long reach and great digging capacity enable it to show especially good results on strip mining, large scale pit excavation, rehandling mine waste and stockpiling.

Other Sauerman Machines — Sauerman also builds Scraper-Loaders, Tautline Cableways, Power Rakes, Durolite Wire Rope Blocks and Sheaves.

LITERATURE — Tell us which of the above machines interest you and we will send concise, easy-to-read catalogs giving you detailed information.

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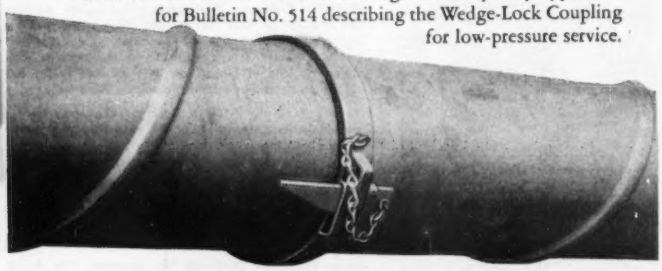
Write for Bulletin No. 513 describing the heavy-duty type, and for Bulletin No. 514 describing the Wedge-Lock Coupling for low-pressure service.



Write for Bulletin No. 513 on Heavy-Duty type; or Bulletin No. 514 for Low-Pressure Coupling.

NAYLOR PIPE

Naylor Pipe Company, 1243 E. 92nd St., Chicago 19, Ill.
New York Office, 350 Madison Avenue, New York 17, N.Y.

Montana *(Continued)*

plore orebodies. The mining partnership consists of Frank Eichelberger, Spokane; E. J. Cleveland, Reno, and E. A. Julian, San Francisco.

★**Little Anaconda mine,** near Superior, is said to have opened some high-grade silver-lead-zinc-copper ore. The property is owned by Dr. P. J. Sweeney and associates of Fort Benton, Mont.

★**International Metals Co.** is negotiating with the U. S. Bureau of Reclamation for electric power from the Canyon Ferry dam now being built near Helena, according to Congressman Mike Mansfield. International expects to build a chrome treatment plant 8½ mi. southeast of Helena for processing chrome ores from Stillwater County.

★**Mitchell Mining Co.,** of Mt. Vernon, Wash., operating in the northern part of Butte, has completed its shaft to the 300-ft. level and is crosscutting to a south vein, which contains values in zinc and silver. A crosscut will be driven to a north vein. The work is being done under the supervision of Everly & Hammond, Butte mining engineers.

★**Though Harvey Machine Co.** had apparently gotten the green light on its $34-million loan for a three-pot aluminum plant at Kalispell, and its $12-million loan for a primary plant near Seattle, Wash., Secretary of the Interior Oscar Chapman has notified RFC and DPA that he has withdrawn his approval of the loans pending an investigation of the grave power shortage that has developed in the northwest. Chapman's disapproval would block both projects.

NEVADA

Maganese, Inc. starts 1,200-ton mill for Three Kids ore

★**Manganese, Inc.,** which bought the Three Kids deposit recently is now preparing to mine and mill 1,200 tons of ore daily by July or August of 1952. All equipment for the mill (total list cost over $1,000,000) is now on order or delivered to the Henderson site. The "Lord Process," a simplified froth-flotation process developed by Southwestern Engineering Co., will be used to beneficiate the 16% Mn ore. The Three Kids open-pit mine will produce 1,200 tons per day, which, when treated will result in a final production of 500 daily tons of metallurgical-grade manganese nodules.

Three Kids has a reserve of 2,500,000 tons of 16% Mn ore, according to President H. S. West, and is now stripped to allow for mining of 550,000 tons; 275,000 tons of ore from government stockpile will also be treated in the mill, which SWECO is

now constructing for Maganese, Inc.

★**Nevada Tungsten Corp.'s** Sodaville mill in Mineral County suffered severe damage as the result of a cloudburst on Aug. 3. Directly in the path of rushing waters and mud, the mill's motors were damaged and other equipment rendered unserviceable until a general clean-up was completed. The mill had only recently been re-equipped with new machinery to treat tungsten ores from the Silver Dyke mine. Both mine and mill are being operated by the Nevada Tungsten Corp., of which John Sinkey is president.

★**Boundy and Cleghorne** are producing 55 tons of tungsten ore daily from their two claims in the Cherry Creek district of White Pine County. At their Chance Mine, they have three men working and producing 15 tons per day by shrinkage stoping. At their Ticup mine not far away, they have four men working underground and one on the surface, producing 40 tons daily. They also operate a 50-ton mill which employs six men.

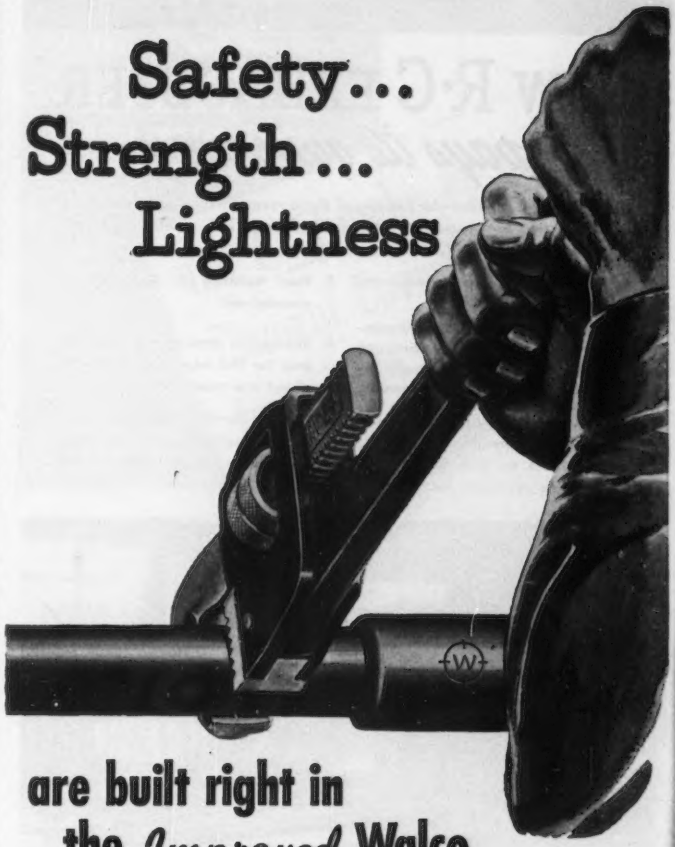
★**The Scheelite Chief Mine** at Minerva in White Pine County is producing 10 daily tons of ore which is being treated at the mill on the property. **The Minerva Scheelite Mining Co.** is operating the property, and has two men working in the 25-ton mill and three underground. Mining is by the open-stope-and-pillar method; miners are also drifting on the ore body. Robert Stopper, Ely, is in charge of the workings.

★**The Conquest Mine** in the Reese River district of Lander County is producing 18 tons of ore daily by open-pitting. Gale G. Peer, owner, has men repairing the shaft, in preparation for ore hoisting. The present force of six men will be enlarged in the near future, according to plans.

★National Lead Co. plans an immediate outlay of $14-million for new construction and installation of equipment to establish the company's new **titanium-processing plant at Henderson.** Units of the Basic Magnesium plant will be used, and plans are to employ 1,000 men or more. Raw materials required for the process include rutile, which will probably be shipped from Florida, and ilmenite, which will be shipped from National Lead's deposits in New York. The plant at Henderson will be operated by **Titanium Metals Corp.,** a company formed and owned jointly by National Lead and Allegheny-Ludlum Steel Corp.

★Newmont Mining Co., with headquarters at Goldfield, is carrying on two mining projects in search of silver ore. At nearby Candelaria a crosscut is progressing steadily, and is already in about 1,000 ft. At Seligman underground lateral workings have reached 1,500 ft., with another 500 ft. of work scheduled. The company is also continuing its search for tungsten

Safety... Strength... Lightness



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1. **The one new unit carries the base load.**
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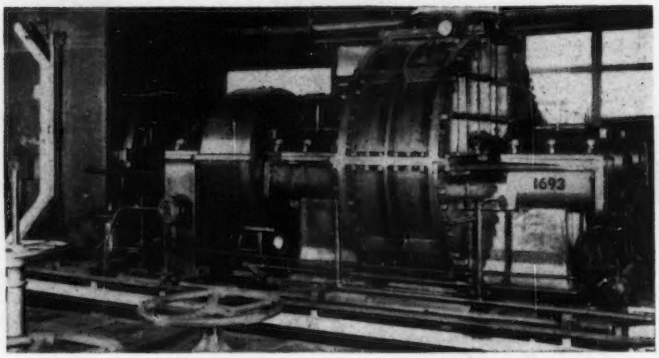
These very satisfactory results were obtained by careful evaluation of all the factors before deciding upon the type of equipment . . . and then by specifying an R-C Rotary Positive Gas Exhauster that will do the work at low operating cost.



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Nevada *(Continued)*

ores, and if successful, will reactivate the Deep Mines mill at Goldfield; several encouraging prospects have already been reported.

★**First ore** shipment from near **Kennecott Copper Co.'s new Kimbley pit** development was made on Aug. 8, and tests are in progress to determine how to process it. The shipment consisted of 23 cars from the Wedge Test Pit, and was consigned to the smelter at McGill for use as flux. Later a mill test will be run on another shipment of ore from the same location. Kennecott has been stripping overburden from the developing Kimbley pit at Lane City, White Pine County, since November, and on July 31 had moved more than 4 million tons of waste. The Wedge Test Pit is east and directly below the Kimbley pit area. Because of its complexity, the ore is to be experimented with to see if it can be used as smelter flux, or should be milled and smelted in the same fashion as the other Kennecott ores. If it can be handled profitably, the small orebody will be mined and then waste material from the Kimbley will be dumped into the pit. If the ore is unprofitably complex, Kennecott may abandon the test pit and use it for dumping ground only. The ore to be mined at the Kimbley is different from that found in the test pit, and approximates the ore found in the Liberty pit at Ruth.

★**Mrs. E. B. Lowman,** Winnemucca, has started an **extensive improvement and development program** at her group of lead-silver claims in the Gold Run mining district. A crew of men is constructing buildings and working on access road to the property. The ore will be shipped to smelters. J. A. Freeman is manager of the operation, S. E. Davis is mine superintendent, W. E. Blake is geologist and metallurgist, and Mrs. Lowman is office manager.

★**Five men are now producing 60 tons of ore daily from a recently re-opened mine** in the Pan-American mining district near Pioche. The property is owned by **Combined Metals Reduction Co.,** and the ore carries lead, zinc and manganese values. The orebody is proving to be one of the largest discovered in the Pioche district.

NEW MEXICO

★**Duval Sulphur & Potash Co.** will begin pilot runs of ores to determine the best method of refining at their potash mine in the Carlsbad district this fall. Full-scale operations are scheduled for Jan. 1952. G. E. Atwood is refinery superintendent.

★**Potash Company of America,** Carlsbad, has announced removal of its sales offices from New York to Washington, D.C.

★**Southwest Minerals Industries,** a

Massachusetts trust, bought the manganese property of United Mining & Milling Co. near Socorro last spring. Shortly thereafter, fire destroyed the plant, and operations have not been resumed. Principals are George K. Kremm, Chicago; D. D. Corum, Warrensburg, Mo.; and George F. Foster, Los Angeles. The group also controls manganese properties in the Artillery Peak district in Arizona.

NORTH CAROLINA

★Work is being pushed on **rebuilding the Feldspar Flotation Corporation** plant at Spruce Pine, N.C., which was badly damaged by fire July 30; the plant is expected to be ready to resume full operations around Oct. 1. Cost of the rebuilding is estimated in excess of $150,000.

The dryer section, in which the fire started, is being replaced by a concrete-and-steel structure. A 30x87-ft. storage section is being added to the main building.

The new plant will have a capacity for processing approximately 4,500 tons of rough material a month, and producing feldspar, fine mica and quartz sand. At the time of the fire it was employing about 60 persons and was operating on three shifts daily, seven days per week.

OREGON

Grants Pass Chrome Depot Buys First Local Ore

★**Hanna Development Co.** is drilling the Nickel Mountain garnierite deposit near Riddle with two churn drills.

★Sixty-five men are employed in perlite production at **Lady Frances mine and mill** in Wasco County. Open pit methods are used. Plaster aggregate and acoustical tile are the products. Dant & Russel Inc., Dantore Division, are the operators.

★Gold mining claims in the **Bohemia district** are scenes of **renewed activity**. Machinery and timbers are being assembled at Vesuvius mine for a new mill to work ore discovered last fall. Assessment work is progressing on John Woodard's syndicate group which has 18 claims under development. Kruse & Williams mill on Cripple Creek is nearing completion. Continued success is reported on his Champion lease by Harold Burton, who is working crews in assessment work. George Conley is installing ground sluice boxes at his Sailors Gulch placer property in preparation for the winter's run.

★At request of Bonneville Power Administration, studies are being made of **development possibilities in Lake County**, where **extensive chemical deposits** are reported. Dr. Philip Skell

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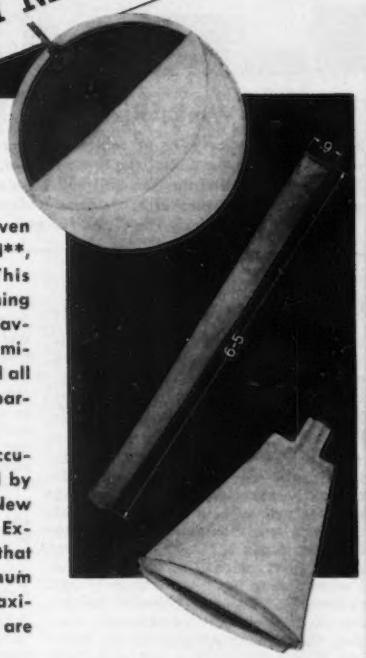

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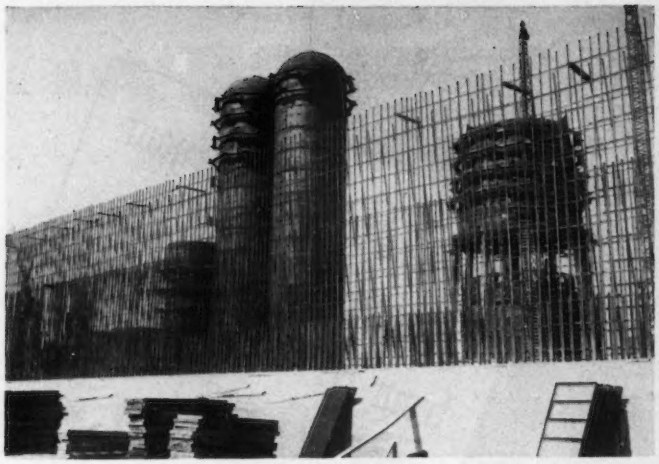


Fairless Works Rises; Will Process Orinoco Ore

Seen through a network of reinforcing bars, which are being erected for a concrete wall at the end of the iron-ore yard, is the No. 1 blast furnace of U. S. Steel at Morrisville, Pa. The mill will have an ingot capacity of 1,800,000 tons per year, will process rich ore from Orinoco Mining Co. (Venezuela); it is just across the Delaware river from Trenton, N. J.

Oregon *(Continued)*

and Walter Scott, professor of chemistry at University of Portland, are conducting the studies. Particular attention will be given to alkali lake deposits owned by American Soda Products Co.

★Chrome ore has started pouring into the Grants Pass purchasing depot, although preparations for sampling and storing are incomplete. The initial shipment was delivered by Oregon Chrome Mines in the Illinois River. About 30 truckloads of ore were delivered during the first 10 days of operation. Pending completion of weighing facilities at the government station, the ore was weighed at the Morton Milling Co. scales, and sampling and assaying were being done by Northwest Testing Laboratories, Portland.

UTAH

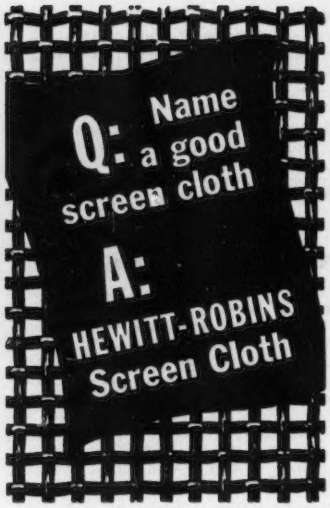
New rolling stock for Bingham—Horn Silver starts production

★Kennecott Copper Corp.'s Bingham open-pit mine, the mills, and refinery went back into production within 24 hr. after the end of the 5-day walkout by Utah Division members of the International Union of Mine, Mill and Smelter Workers; International Brotherhood of Electrical Workers; International Association of Machinists; and the Brotherhood of Locomotive Firemen and Enginemen.

Representatives of the corporation reported, after the Washington agreement was announced, that wage increases accorded Kennecott workers, not including the new pension provisions, will cost Kennecott $4 million annually. The agreement calls for a non-contributory pension plan and a 15¢ per hr. wage increase retroactive to July 1, 1951. Joint Strike Committee meetings held at Magna and Copperton ratified the Washington settlement one day after it was made public.

★**Kennecott Copper Corp.** has reported it is to receive **tax amortization** consideration for the writing off of **major projects at the Bingham mine and the Magna mill,** with permission granted to write off 75% of the improvement costs in 5 rather than 20 yr. At a cost of $1,946,096 the corporation is purchasing eighty 40-yd. ore cars and four new electric locomotives for its open-cut mine haulage. Meantime, a $670,000 armortization consideration will be utilized for the purchase of pump facilities for leaching low-grade copper values in the Bingham mine dump.

★**The Metal Producers, Inc., has erected a 500-ton mill** 4 mi. west of Milford, and will use the plant to handle ore from one of Utah's most famous older mines, the once fabulously rich Horn Silver. Production of 400 tons daily from the Horn Silver was scheduled by the close of 1951, accord-



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BECAUSE its heat treatment and micro-structure make Super-Gyraloy highly resistant to abrasion without sacrificing ductility. You can actually bend a wire of this cloth around its own diameter without fracture.

BECAUSE Hewitt-Robins Super-Gyraloy Screen Cloth comes in the *weave* you want . . . the *size opening* you need.

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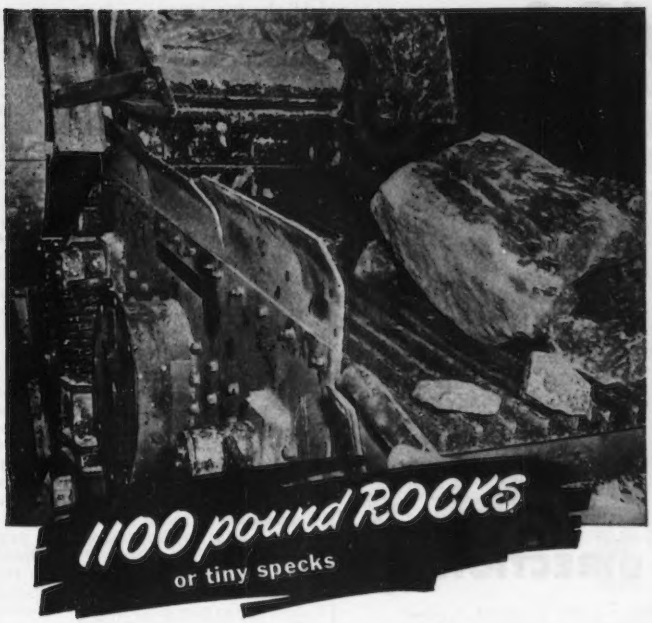

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ing to mill superintendent Rip Thompson.

Shipments of stope fill to the mill began in early September while a mine crew of 20 workers began initial activities. Jack Lowe is mine superintendent, with D. C. Peacock general manager of the overall operation.

★Evidence of still **further activity in uranium** workings in **southern Utah** was strengthened in late August by announcement that the **Vanadium Corp. of America** has purchased 50 claims in Garfield and Wayne counties from A. A. Hung and Sons, Hanksville. The 5-year leases are reportedly located in the neighborhood of Poison Springs at the confluence of the Colorado and Green Rivers.

★**A second drift** on the 2,100 level is reported **underway** in the joint project at Park City being undertaken by the **Silver King Coalition Mines Co. and Park Utah Consolidated Mines Co.** Identified as the 2,103 drift, the new working is midway between recently reported explorations on the 1,900 level to the east and the 2,102 drift one-half mile west.

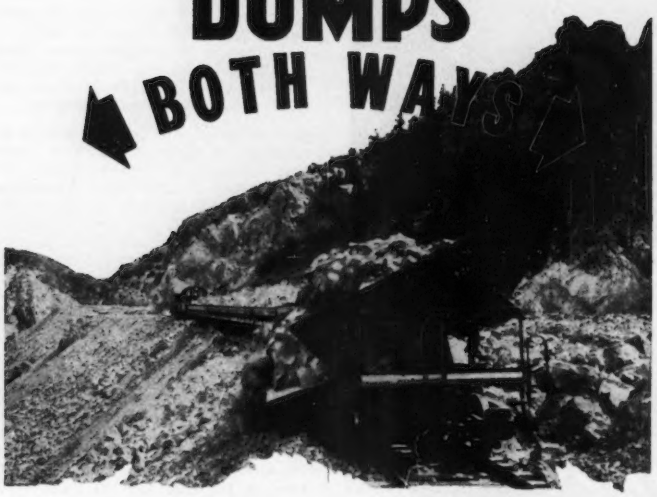
Word at Park City is that an effort is being made via the new drift to encounter at greater depth the westward dipping fissures already encountered in joint ground on the 1,900 level. The fissures, while not large, have recently proved high in values. The 2,102-level objective, an extension of the rich Crescent fissure, may be reached by October after some 600 ft. of drifting; work on the level began in midsummer. The new 2,103 drift will likewise be some 600 ft. in length. About one-half mile of ground common to the two companies has been committed to the project.

Meanwhile, Park Utah Consolidated Mines Co. officials have announced that a recent $22,500 DMA grant is being utilized to extend a 1,400 ft. crosscut on the 2,100 ft. level off the Ontario drainage tunnel in the south portion of the company's Park City holdings. An additional 300 ft. of crosscutting is scheduled under the lead-zinc matching funds program. Preparations are also reported for working off the old Star of Utah tunnel in an effort to intersect an extension of the Naildriver ore shoot. Transformers and pumps are already installed for the project, which will include renovation of the Star of Utah tunnel and some 250 ft. of new tunneling into the old Naildriver property.

★Further signs of health in the Park City district are seen in the signing of a contract by the **New Park Mining Co. with Filtrol Corp.** for exploration and development of **halloysite clays** within the district. The project, first of its kind in the area, calls for the working of clay deposits in the upper level of New Park's Park-Bingham tunnel.

The Filtrol Corp. uses the clay to manufacture a catalytic-cracking agent, and has previously obtained the major portion of its clays from the Dragon Consolidated.

DUMPS BOTH WAYS



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Utah *(Continued)*

★Officials of **Chief Consolidated Mining Co.** reported in late August that sufficient funds had been raised through a public capital stock offering to enable the carrying out of the planned exploration and development program at the company's Eureka district lead-zinc mine. Under a DMA matching-fund program, funds raised from the stock issue will go toward meeting the company share of a $463,420 program already underway at the Chief's No. 1 mine. Most of the funds are being spent for pumping costs. It was reported by early September that much of the exploration area had been dewatered, and that raising was already underway on the 2,700 ft. level.

★**New discoveries of uranium ore** in and near the Farmer John claims of the **Bullion Monarch Mining Co.** operation at Marysvale, Utah, will result in the carrying out of three major development programs in the near future. Present main workings are in a tunnel at the 135-ft. level. An abundance of radon gases in the tunnel resulted in the sinking of a new ventilation shaft. This work disclosed that the present orebody extends 150 ft. and nearly to the surface Diamond drilling has now confirmed ore deposits to a depth of 350 ft. Uranium ore being delivered to the Marysvale stockpile and sent to mills runs between 14% and 20%, according to company reports.

WASHINGTON

AS&R may start work at Van Stone soon.

★**Exploration loans granted by DMA in July,** amounts loaned and minerals sought, are listed as follows for the State: Goldfield Consolidated Mines, Stevens County, $11,527, lead-zinc; G.O.P. Antimony Corp., Okanogan County, $7,313, antimony; Scandia mine, Stevens County, $5,780, lead-zinc; and American Zinc, Lead & Smelting Co., Pend Oreille County, $60,000, lead-zinc.

★Facilities newly certified for accelerated tax write-offs in Washington include **Reynolds Metals Co.,** Longview, aluminum ingot reduction plant, $9,999,000, 80%; and **Kaiser Aluminum & Chemical Corp.,** Mead, two aluminum reduction plants, 80%, $12,790,000 and $364,000, respectively.

CONVENTIONS:

Oct. 14-19, World Metallurgical Congress, Detroit, Mich.
October 22-24, American Mining Congress, Los Angeles, Calif.
Oct. 29-Nov. 2, AIME Fall Meeting, Mexico City, Mexico.

★This fall, **American Smelting & Refining Co.** hopes to start construction of its 1,000-ton mill at its Van Stone zinc-lead mine. The project will take about a year. Cost has been unofficially estimated at $1 million. P. A. Lewis, resident engineer, reported that mining will be by open-pit and that the mill will be built about 1,500 ft. from the mine. About 80 men will be employed when mining gets underway. Diamond drilling is still in progress. Washington Water Power is clearing a right-of-way for a 14-mi. power line to supply electricity for the operations; Isbell Construction Co. of Reno, Nev., is constructing a 4-mi. road from Onion Creek school house to the mill site; and Stevens County is improving a road where heavy traffic is expected in connection with the operations.

★Preliminary preparations for resuming development work at the **Pacific Mutual Silver-Lead Co.'s** property, near Kellar, got underway in August, according to C. A. Gray, manager. Diamond drilling to prove six ore shoots at greater depth is planned.

★**Cascade Gold Mining & Milling Co.** which filed articles of incorporation in Olympia in August, has started rehabilitation work at the copper-gold property known as the Durrwachter, at the head of the Kechess Lake in Kittitas County. Tunnels have been cleared at the property which has been idle for 10 years. A 25-ton mill is on the property.

★**G.O.P. Antimony, Inc.,** with property east of Omak, has made the State's biggest antimony shipment since World War I, according to Ernest Oberling, general manager. He reported that a 40-ton carload of flotation concentrates and a load of sorted ore shipped during July and August contained a total of 80,000 lb. of antimony.

★The **Washington State supreme court reversed** the decision of Spokane County superior court in the lawsuit of E. M. Skaug of the Lucky Friday mine against Earl Gibbs and I. M. Hunley of Bonanza Lead. The supreme court's unanimous decision nullifies a $14,000 judgment awarded to Skaug in September, 1950.

★**American Smelting & Refining Co.** has purchased additional shares of the stock of Federal Mining & Smelting Co. and now holds 136,760 shares of the 246,640 outstanding (more than 55%, according to Walter J. Nichols, Spokane).

★Thomas Le Page of Spokane, president of **Clugston Creek Mining Co.,** reported recently that the company has purchased the Chloride Queen iron property from Colville Queen Mining Co., thereby acquiring 420 acres of deeded ground and bringing total holdings up to more than 700 acres. The purchase was under lease and bond with a cash payment. Private capital is to be used for development work including diamond drilling and tunnel-

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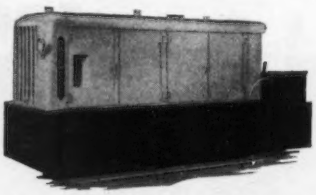

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Washington *(Continued)*

ing under a promising mineralized outcrop. Work was to begin this fall At one time the Chloride Queen property had a 100-ton mill and produced iron ore for an iron works in Colville.

★**Pend Oreille Mines & Metals Co.** recently purchased 50 four-room houses from Good Hope Wreckers of Farragut, Idaho, and will set them up just outside the corporate limits of Metaline Falls to provide low-cost rental units for employees. Also reported: **Reeves MacDonald, Ltd.**, the company's subsidiary across the Canadian border, has applied to the Canadian Foreign Exchange Control Board for permission to repay in full its loan from Pend Oreille for initial mining and milling operations.

★**Gold Gulch Mining Co.**, with property consisting of two placer claims and eight patented lode claims adjoining Gold Bond Mining Co.'s property in the Blewett area near Wenatchee, is rehabilitating old tunnels. The company has stockpiled about 75 tons of gold ore from workings, and according to John B. Youngman, Jr., president, it will average more than $45 a ton. He said there are long-range plans for a mill. George Tonemaker, Zillah, is vice president and M. J. Jamison, Coeur d'Alene, Idaho, is secretary-treasurer.

★**Columbia Lead & Zinc Mining Co.** plans to increase its operations on its approximately 500-acre holdings in the Metaline area south of "Z" canyon. Accumulated through development work done during the past year, a large stockpile of ore runs from 4 to 15% combined zinc-lead. More than 1,400 ft. of long-hole drilling has been done. Plans call for diamond drilling to test the depth of ore. Robert P. Wallis is the new president.

★A drift is being driven along a vein in an exploratory program approved by DMA for the **Scandia mine** in Stevens County; about 15 daily tons of zinc ore is being stock-piled. After 100 ft. of drifting, the company plans of zinc ore is being stockpiled. After 250 ft. lower down, and to explore laterally from a point 50 ft. from the bottom of the shaft. Assays from the drift over a 7-ft. face averaged 9.1% zinc. Ore from a cut at the shaft ran 30.7% over a width of 4 ft., owner Raleigh Hallenius of Spokane reported. The Scandia group, about 6 mi. southeast of Northport, consists of five unpatented mining claims and 70 acres of deeded land.

WISCONSIN-ILLINOIS

Eagle-Picher develops Birkett unit

★**Eagle-Picher Mining & Smelting Co.**, Galena, Illinois is starting to drive

an inclined haulage adit for ore from its Birkett Unit, 1½ mi. northeast of Hazel Green, Wisconsin. The "Birkett Unit" consists of the old Burns and Birkett Mines, developed and mined by Vinegar Hill Zinc Co. during World War I, two newly-proved extensions of these orebodies, and two new nearby orebodies. The old Burns and Birkett Mines are connected by a 1700-ft. cross-cut and the two new orebodies will be similarly connected to the unit.

Two old shafts into the Burns and Birkett orebodies are being reconditioned to provide for ventilation and pumping. Pumping capacity will be 7,500 gpm. The inclined adit, 14 ft. x 18 ft. in cross section, will be 1800-ft. long driven on a 10% grade; the ore will be hauled to portal by diesel trucks. Primary crushing will be done at the mine and the ore will then be hauled to Eagle-Picher's 1,600-ton flotation mill, 4 mi. south of Hazel Green near Galena, Illinois.

The mill is now being fed by ore from the nearby Graham-Snyder-Spillane orebody, and by custom ore.

★**Four DMA exploration loans** have been granted to Wisconsin mining companies: Calumet & Hecla Consolidated Copper Co., Wicsonsin Branch, Shullsburg, Wisconsin; Vinegar Hill Zinc Co., Shullsburg, Wisconsin; Dodgeville Mining Co., Dodgeville, Wisconsin; Little Grant Mining Co., Platteville, Wisconsin.

★**The USGS,** acting through its Washington, D.C., office, has completed an airborne magnetometer survey of a 12-mi.-wide strip across the entire district from the Wisconsin River on the north to the Mississippi River on the south. All flights were made from the Madison airport. Geochemical soil analysis work being done by the USGS has been temporarily suspended.

The USGS is remapping the topography of twelve 7½ minute quadrangles, the area defined by Montfort, Hazel Green, Darlington, and Dodgeville, Wisconsin.

★**Mifflin Mining Co., Inc.,** is completing construction of a new wet-crushing unit at its Cokerville mine and open-pit, 3 mi. southeast of Livingston, Wisconsin. The company purchased the 300-ton flotation mill of the L.G.&W. Mining Co. at Mifflin, 3 mi. southeast of the mine in April and dewatered the Coker #1 mine and open-pit under a lease with New Jersey Zinc Co. To date all crushing has been done dry with a portable hammer mill at the mine. Because of the sticky consistency of clay in the ore, dry crushing has not proved entirely satisfactory. The company has been shipping 300 tons of 60%-Zn concentrates per month.

★**The George M. Baker Milling Co.** has changed the flowsheet and increased the capacity of its flotation mill 5 mi. west of Shullsburg, Wis. (recently purchased from the Chestnut Hill Zinc Co.). The plant is operating on tailings from several old mines

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Wisc.-Ill. *(Continued)*

nearby and is treating 350 tons per day of 1.5%-Zn heads. This feed is first sent to a screen; the fines are recovered and sent directly to the ball mill; the coarse remainder is put over a wet jig and the jig concentrate plus dewatered sludge from the jigs complete the ball mill feed. A high grade of concentrate is being produced: Mr. Baker reports having shipped no car with less than a 63%-Zn content.

ALASKA

★DMA announced a loan of $54,000 to **Zenda Gold Mining Co.** to explore for tin on Seward Peninsula. The maximum of 90% of the financial assistance is being provided by the Government.

★**U. S. Tin Mines**, planning year-around operations near Teller, expects to increase production to more than 100 tons daily by next season, Paul Sorenson, superintendent, reported in Fairbanks this summer. A mill was brought to Nome this season for installation at the property.

IN CANADA

1951 Production to reach new all-time peak

★Another all-time record for **Canadian mineral production** is in sight this year. Output for 1951 will probably leave last year's total of $1.04 billion well behind. Barring some unforeseen factor in the last quarter of the year—and it would have to be a drastically adverse one—production for all of 1951 will top $1.2 billion, and it might even approach $1.5 billion. Prices and volume are up for all but two of the major minerals—gold and coal.

Largest gains are being registered by natural gas and petroleum, up 50% now that the Alberta-Lake Superior pipe line is in operation; by iron ore, up slightly more than 50% with improved tonnage from Wabana; and by asbestos, up 30%. (Iron ore may lose part of its gain in the latter months of the season, because of the Great Lakes shipping shortage.)

Production of major base metals is running well ahead of last year. Silver, with a probable total of 25 million oz. for the year, set a monthly record in June higher than any since 1940.

BRITISH COLUMBIA

★Mineral production in British Columbia hit $148,155,060 in 1950, second only to the all-time high of $152,524,752 in 1948.

Zinc production held first place in

1950 at $48,82,765, exceeding the value of any metal in any year, except lead at $60,072,542 in 1948. The metals and sulphur derived from lode-mining accounted for more than 85% of the total value.

The **increased number of important, widely separated producers of silver lead and zinc** is an interesting development.

Britannia has now become an important producer of zinc, and **Silbak Premier**, of lead and zinc; the **Torbit** at Alice Arm is a substantial producer of silver with minor lead.

The **Silver Standard** at Hazleton is an important producer of silver, lead and zinc; the **Reeves MacDonald** and **Jersey** (Canadian Exploration) are substantial producers of zinc, lead and silver.

★A boom in copper, coal and bentonite is forecast for the Princeton area. **Granby Consolidation Mining, Smelting & Power Co.** has **staked 60 claims** within 2 mi. of Princeton on an old property known to have low-grade copper showings, and a regional report of the Unemployment Insurance Commission reports the company has started stripping the surface of claims with a bulldozer following satisfactory initial tests. If sufficient indications are exposed, a drilling program is planned.

★**Canadian Exploration** plans to **double the size of the 250-ton mill** now being completed for the federal government at the **Emerald tungsten mine** near Salmo. The company has negotiated an agreement for sale of the estimated tungsten production for 6 yr. from 1952 to mid-1958. For 2 yr. the mill will be used to handle government ore, after which its capacity will be available to Canadian Exploration. At the **Jersey lead-zinc operation** of CE for the 3 mo. ended June 30, a total of 44,176 tons was handled averaging 1.93% lead and 5.73% zinc, and producing 5,394 tons of concentrates. The mill has been handling 15,000 tons monthly; output was due to reach 21,000 tons monthly by September.

★**Western Uranium Cobalt Mines Ltd.** expects to have two mills operating at its properties near Hazelton in the Omineca mining division by October, one handling tungsten ore and the other tungsten and copper-gold-silver. The latter will be a 150-200 ton mill at the Rocher de Boule property, where tungsten has been found, and the all-tungsten operation will be a 100-115-ton mill at the nearby Red Rose mine leased from Consolidated Mining & Smelting Co. Output of cobalt and uranium will be considered after the mills go into production. Additional properties, consisting of five claims and three fractions known as the Delta Copper and Highland Boy, adjoining the Rocher de Boule operation, have been acquired by Western Uranium.

★**Ainsworth Base Metals Ltd., is planning** to acquire a 50-ton mill for its property near Cork Province in the Slocan and hopes to have it in operation within 6 mo. Meanwhile, arrangements have been made to ship 300 tons of ore monthly from drifting work to the Kootenay-Florence mill.

★**Shipments of high-grade lead-zinc ore** have started **from Emerald Glacier mine** on Sweeney Mountain near Tahtsa Lake in the Omineca mining division, to the Aluminum Company of Canada's big power development at Nechako Canyon. A dozen trucks are hauling ore to the railway at Burns Lake, and are taking pay loads for Alcan on the return. If winter halts shipments, the mine crew will be put on development and a backlog of ore stockpiled for start of milling in 1952 when the Kenville mill, now at Nelson, will be moved to the property.

★**The mill at Doreen Mines Ltd.**, between Hazelton and Terrace, was scheduled to be put into operation in September. The 3,000-ft. aerial tram from mine to mill is complete.

★**Estella Mines Ltd.**, mill at Wasa, near Kimberley, is due to be **in operation by October.** Concentrates are expected to run as high as 57 to 60% zinc, and production is predicted to hit 1,000 tons monthly.

★**Silbak Premier had reached an agreement** to mine large lead-zinc deposits on the Premier Border Gold Mining Co. property in Portland Canal district. The agreement, supplementary to the existing agreement under which Silbak mines and mills Premier Border ore, provides a 3-yr. pact, effective Oct. 1, 1951 under which Silbak provides all funds for development and is to be reimbursed from first proceeds; after that profits will be divided evenly.

The one-eighth mile aerial tramway from Indian mine to the Silbak Premier mill has been put into operation, with a capacity of 100 tons per eight-hour shift, working on a 24-hr. basis. Blocked-out Indian ore reserves are estimated at 25,000 tons grading 11 oz. gold, 5.47 oz. silver, 5.8% lead and 7.8% zinc.

★Development results at the **Atlin-Ruffner (B.C.) Mines Ltd.** property in Atlin mining division near the B. C.-Yukon border have led directors to consider installing a concentrator next year to recover gold, silver, lead and zinc. Four ore discoveries have been made recently on the property. The mine is due to ship 150 tons monthly for 3 mo. from September, 250 tons in December and 400 tons monthly thereafter.

★**Woodbury Mines Ltd.** has made a **strike in a lead-zinc** bearing formation at Ainsworth in the west Kootenay: Diamond drills intersected ore on the Bell vein at depth. Drilling intersected 8 in. of high-grade ore at 230 ft., and again cut 30 in. of ore assaying 28% combined lead and zinc with silver values at 293 ft.

★Preliminary tests on ore from the

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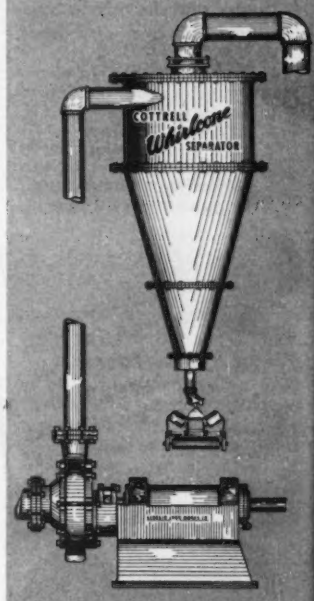

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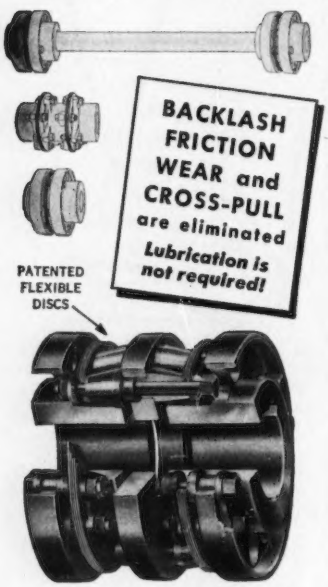

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British Columbia *(Continued)*

Mamie and Hummingbird workings of **Sil-Van Consolidated Mining & Milling Co. Ltd.** on Hudson's Bay Mt. near Smithers indicate ores from both veins can be treated by sink-float treatment to remove 35 to 50% of waste before flotation treatment. Further study and tests will be carried out by Sink and Float Corporation of America. Higher-grade ore has been found on the lower level of the Mamie, where channel samples showed an average 1.1 ft. of 0.81 oz. gold, 7.7 oz. silver, 28.8% zinc.

★Extension of an old stope at the Monitor mine, near Sandon, one of seven properties being developed by **Kootenay Belle Gold Mines, Ltd.**, has run into ore worth $130 a ton across 17 in., or $60 a ton across 3 ft. Assays across 17 in. give 38.2 oz. silver, 29% lead and 21% zinc. The stope is on the bottom or fifth level. The Monitor ore is being shipped to Kootenay Belle's Whitewater and Sandon plants.

★**Transcontinental Resources, Ltd.** has cut 10 ft. on a new ore body, assaying 1 oz. silver per ton and 15.1% zinc, in its underground development of the Danzig zinc mine on Vancouver Island.

★**Hedley Yuniman Gold Fields, Ltd.** will deepen its shaft at the Iota group near Hedley to establish a 100-ft. level.

★**Giant Mascot Mines**, at Spillimacheen, since start of milling Mar. 16 until August, **shipped 23 cars of lead concentrate** (68% lead and 16 oz. silver) to Trail smelter. Net smelter returns from the first 19 cars totaled $152,831. Ore averaged 6% lead with 2 oz. silver per ton, but a minimum grade of 7% lead is expected when all stopes are prepared.

MANITOBA

★**Hudson Bay Mining and Smelting Co., Ltd.**, is now sinking a winze from below the 4,000-ft. level to 50 ft. below the 5,000-ft. level in the Flin Flon mine. At the Schist Lake mine the shaft is being deepened from 250 ft. to 850 ft. At the North Star mine, 10 mi. east of Flin Flon, a shaft is being sunk to 1,050 ft.

Both units of the zinc fuming plant are expected to be in full operation shortly. The milling rate will then be reduced from 5,000 to 4,000 tons daily and will require the mining of 1,460,000 tons of ore per year. Zinc residue, 50,000 tons of which will be produced annually, will be treated together with 58,500 tons of residue from stockpile.

★**Lee Gordon Mines** and **Femco Mines** announce a joint program of **diamond drilling** is ready to begin on their holdings at Vamp Lake, 15 mi. south of Sherridon.

★**Sherritt Gordon Mines**: Under recent offering of rights to shareholders of record June 9, 1,066,960 shares were subscribed for by shareholders at $2 a share and the balance of the offering was sold at $2 per share. The company has also issued an additional one million shares to Newmont Mining Corp. at $2 a share. Issued capital is 8,133,318 shares, leaving 3,866,682 shares in the treasury.

ONTARIO

★**Harrison-Hibbert Mines**, Cobalt area prospect, expects to start shipping ore in October to the mill of **United Cobalt Mines**. Planned initial production is 50 tons daily. About 4,000 tons of ore have been stockpiled underground and on surface; grade is about 30 oz. silver per ton and 1.5% cobalt. Approximately 60,000 tons is indicated as the potential. United Cobalt owns the former Ausic mill and plans to use it for treating its own and custom ores.

★**At New Dickenson Mines** the daily rate of milling is being held close to rated capacity at 300 tons, but management believes 325 or 350 tons could be handled. In the meantime, the shaft is being deepened to 1,250 ft. to permit the opening of four new levels, with completion expected late in the year.

★Ontario is going to have **another iron producer. Marmoraton Iron Mines**, wholly-owned subsidiary of **Bethlehem Steel Corp.**, is planning a mine and concentrator at Marmora, in the province's southeastern section. It will be an open-cut operation with an annual output of 400,000 tons of concentrates in an 8-mo. season. Unofficial estimates have placed reserves (by surface drilling) as high as 18 million tons, good for more than 25 years' output at the planned rate. Further unofficial reports schedule start of production for some time in 1954. The mine will be recalled as the one which was discovered by drilling that was instigated by the aeromagnetic survey of 1949.

★New finances are being arranged for **Delhi (Temagami) Gold Mines** for its base metal property in the Temagami area, where encouraging results were obtained earlier in the year in limited drifting on five veins on the one adit level. It is planned to resume development, and also to sink a shaft to open two more levels.

★**Central Patricia Mines**, veteran gold producer of the Pickle Lake area, is bowing out gracefully this fall after a productive life that started in 1934. The mine is just about out of ore, and high costs make further work a dubious gamble. The company, however, will carry on with more than $2 million in net current assets, and a considerable amount will be realized from the sale of its supplies and equipment. Also on the closing list is **Hard Rock Gold Mines**, one of the earliest Little Long Lac mines. It's the same story there; no more ore, rising costs, but a strong cash position.

★**Pickle Crow Gold Mines** has nearly finished deepening its No. 1 shaft to 2,950 ft., and will soon be well into lateral work on the first of the three new levels to be established down to 2,900 ft. First objective will be to look at the possible downward continuation of new ore discovered last year in the iron formation on the present bottom level at 2,450 ft. Also to be investigated is the No. 1 vein, which is known to continue downward, but which on its deeper levels has not been the generous ore source that made it the mine's prime source of profit in the early days.

Consideration is also being given by Pickle Crow management to exploration at depth of the No. 5 vein, some 2,200 ft. southwest of the No. 1. A new shaft may possibly be sunk in this area.

QUEBEC

★Another copper producer appears to be shaping up in the Eastern Townships. **Quebec Copper Corp.** has obtained several excellent intersections in surface drilling near the old workings of the former Huntingdon mine, acquired by the company last winter after years of idleness. The operation came quickly to public attention a few weeks ago when hole H-19 intersected 127.5 ft. of ore averaging 2.6% copper. The operation is partly financed by East Sullivan Mines.

★Drifting is now well under way on the new copper showing of **Golden Manitou Mines**. Initial work on the 1,720-ft. level has disclosed two lenses, the first of which has a length of 191 ft. averaging 3.48% copper and 0.5 oz. silver across drift width. Discovered last year in lateral drilling from the main zinc-lead-silver workings, the new show lies 750 ft. north of and parallel to them. Drilling indicated one million tons averaging 2.5% copper.

★**Quebec Labrador Development Co.**, holding an exploration license on 500 sq. mi. in Northern Quebec along the Labrador trough, plans to continue surface drilling and other exploration work throughout the coming winter. A budget of $80,000 has been set aside for this purpose. Farther north in the same area **Fenimore Iron Mines** will also work through the cold season; the necessary supplies were taken in by boat around the northern tip of Labrador into Ungava Bay. Both companies have secured encouraging indications of iron orebodies.

★Shaft-sinking is planned by **Campbell Chibougamau Mines** on its Merrill Island property in the Chibougamau area. The opening will be of 4-compartment size, with initial depth objective of 1,000 ft. Schedule calls for starting work early in the fall. Surface work suggests a potential of 1,350 tons per vertical foot averaging 3.5% copper and 0.15 oz. gold per ton.

★At the **Beauchastel property of Bazooka Mines**, shaft-sinking has been completed to the first objective at 400 ft., and lateral work has been started at the first level. Operational control of the young gold prospect is held by **Eldona Mines**, whose own property in the Noranda district is now a zinc-gold producer. The known ore area of the Eldona mine is under lease to **Harrison Exploration and Drilling Co.**, which operates the former McWatters mill as a custom plant. Ore in Eldona's leased section (above the 1,150-ft. level) was estimated at 192,000 tons averaging 0.14 oz. gold, 3.14 oz. silver, and 4.3% zinc per ton. First production records suggest that these averages will prove conservative. Eldona receives one-third of all profits.

★A second big operating shaft is to be sunk at the Jeffrey mine of **Canadian Johns-Manville Co.** at Asbestos. It will be sunk to establish a second caving level at 1,400 ft.; the first one is already in operation at the 750-ft. horizon. Completion of the new shaft and level will take between four and five years. The Jeffrey is the largest asbestos mine in the world, and accounts for 50% of Canada's production.

YUKON

★Silver-lead production of Yukon Territory is expected to set a new record again this year.

A new road from Whitehorse to Mayo, high-base metal prices and a proposed hydro development on the Mayo River have started a new boom. Development and exploration programs have been stepped up, with at least half a dozen new projects under way in the Mayo district, and mining companies are searching for new properties throughout the north.

★**United Keno Hill Mines has gone deeper** in ore at its Hector mine than any other working in the Mayo district. The No. 3 vein has been intersected by a crosscut on the 525-ft. level with good ore encountered over an 11-ft. width. Nos. 4 and 4 veins are expected to be intersected by an extension of the crosscut. The new shaft is below the 400 ft. adit level of the Hector and a second new level at 650 ft. has been established.

★**Mackeno Mines** has opened 50 ft. of ore at its upper workings in the Mayo district and is continuing to drift south. Samples from the vein, which averages 6 ft. in width, average about 50 oz. in silver, according to K. C. Wilson, manager, with zinc running as high as 6% and lead up to 18%.

At least **half a dozen new companies** are working in the district, including Mackeno Mines and Yukeno. Mackeno is spending between $400,000 and $500,000 this year to develop its silver-lead-zinc mine, according to company president G. A. Duff. The company has 29 claims and expects to have a mill in operation in 1953.

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Yukon *(Continued)*

★**Noranda Mines Ltd.** has been conducting surveys in recent years in the Whitehorse district, the largest in the Yukon. Almost every type of mineral occurrence has been found in this district, including lead, zinc, copper, lode, gold, silver, antimony, manganese, placer gold, molybdenite, coal, tungsten and tin.

IN AFRICA

Scheelite reefs being developed

★A new development in centralized operations to **reduce mining costs through bulk-buying and staff-reduction** is the creation of **Inter-Mine Services** (O.F.S.) (Pty.) Ltd. This Company will be responsible for the purchase and distribution of all stores for the existing seven gold mines of the Anglo-American group being opened up in the **Free State.** Apart from savings through large-scale buying, other economies will be obtained through the use of standardized equipment by all mines of the group. Individual mines will only have small stores carrying immediate requirements. A 60-acre site is now being excavated for the organization. The stores section itself will cover about 10½ acres, of which 60,000 sq. ft. will be under cover. Provision is also being made for the erection of a central bakery and brewery to provide part of the rations for African laborers—the beer, made from millet, is a native drink with a high vitamin content and disease-resistant qualities.

★Base mineral production and **sales by the Union of South Africa rose sharply** during the first six months of this year. Copper sales amounted to 1,741 tons—a volume increase of more than 10%; revenue received rose by more than 50%. Tin output was 391 tons compared with 295 for the first half of 1950 and realized £461,000 against £166,000. Chrome sales rose from 237,000 to 314,000 tons and the value from £613 to £839,000. Manganese producers were hampered by shortage of railway trucks. Sales amounted to only 382,000 tons against 400,000 tons during the first half of 1950. The value, however, was £89,000 higher at £1,535,000.

The publication of production figures for platinum has been suspended for security reasons and also to protect the competitive position of the industry.

★Recent drilling operations in the **Orange Free State** suggest the existence of another rich gold-bearing deposit immediately to the north of Harmony G.M. (which is estimated to be one of the three richest properties being developed in the new fields). The results obtained so far have been 1,156, 2,154 and 911 in. dwts. The pay limit for the Free State is taken as 150 in. dwts. The depth of the reef is between 5,500 and 6,000 ft.

★Intensive work is now being done to open up **scheelite deposits in the Upington district of the northern Cape Province.** Small-scale sporadic production has been undertaken in the past, but has been limited to a few tons a month because individual operators have been liable to super-tax which rendered large-scale operation barely profitable. Recent assays yielded more than 70% tungsten oxide and the reef formations have been opened up to a depth of 120 ft.

IN AUSTRALIA

Tin-mining boom seen for Tasmania

★**Australian gold production** during the first five months of 1951 was almost 13% greater than during the same period last year but substantially below pre-war levels.

Industry leaders point out, however, that additional increases in wages and in the costs of materials and equipment made the cost of producing Australian gold still higher. On the other hand the prospecting side of the industry has almost faded out of the picture and only a few seasoned old-timers are still battling along in search of new fields. On the whole gold prospecting does not attract any more young people in Australia.

★Statistical data now released by the Australian Mines and Metals Association covers Australian base-metal production for the calendar year ending December 31, 1950. **Increases are shown for lead, zinc, silver and copper and a decrease for tin.**

★Linden's Mine at Yundamundera is reporting a true shear type of reef and would be probably carried to great depths. A proposal has been made to sink a vertical shaft on the main ore shoot to cut the reef at about 200 ft.

★**Antimony Mines of Victoria is being formed** by a group of companies to work antimony deposits near Heathcote, Victoria. The new company will acquire South Costerfield Antimony and Gold Mining Co., N.L., and consolidate the company's workings with those of the Alison, Bombay, Bradleys and Main mines of the Costerfield antimony field.

The antimony reefs at Costerfield are narrow but extensive and rich and contain much gold. A new process will permit full realization of gold values.

★Following the reopening of three old tin mines in Tasmania, experts express the hope that the **biggest tin boom** in the country since the end of last century is inevitable.

★With tin fetching a good price nowadays, the **Briseis mine at Derby**, formerly the biggest alluvial tin mine in Australia, is being worked for the third time and expects to double its production in the next 12 months.

★**Aberfoyle Tin N.L.** registered in July a production only very slightly below the record of the previous period. **King Island Scheelite** produced only 81.62 tons of scheelite concentrates in July against 84.77 in June. Production for the nine months to July 28 was worth £1,142,871.

★**Full milling plant of Montana Silver Lead, N.L.**, at Zeehan should be in operation by the end of this year. All equipment is now on the mine and is being installed. In the meantime the company decided to sell forfeited shares and to use proceedings to electrify the plant, to buy new equipment and to continue diamond drilling.

★**Wolfram Hill, N.L., reports its first output** with about 6% wolfram and improving with depth. Ore production is continued satisfactorily and high ore is showing in walls.

★A consultant who inspected the **Merloo Gold Mine's** wolfram field at Wauchope claims in his reports that the surface of the company's two leases is covered to a depth of 3 ft. with material carrying payable quantities of wolfram.

★**Doria Gold Mines, N.L.**, has obtained a **sampling option** over **four wolfram leases** at Hatches Creek but negotiations for a sampling option at Mosquito Creek are not yet completed.

★**New Sterling Gold Mines, N.L.**, has obtained the right to acquire shares in Central Scheelite which holds a scheelite lease at Mosquito Creek. Lady Claire's manager appears to have opened up a valuable new area offering prospects of quick results. The company intends to sell forfeited shares to finance development of this area.

★**Falcon Gold Mines, N.L.**, reports that the shaft on the Edna Berryl mine, Tennant Creek, has been sunk from 175 to 183 ft. Good specimen gold is showing in a hematite formation.

IN EUROPE

ENGLAND

Metals and minerals are keys to rearmament

Labor is Britain's biggest rearmament bottleneck. The **second** biggest **bottleneck** in Britain's rearmament program is **lack of raw materials.** This is true despite infinitely greater cutbacks in "non-essential usage" than exist in the U.S.

From the Parliamentary report and the latest issue of the Board of Trade Journal, here is a brief run-down of the supply and demand situation on the key defense metals and minerals here:

Steel: The shortage of steel scrap has put steel at the top of the scarce materials list. Britain expects to get only half a million tons of steel scrap from Germany this year as against 2 million tons last year. Some of this can be made up from increased pig iron production, but not enough to avert a severe drop from this year's record steel output of 16 million tons.

Hard hit by the scrap shortage will be the South Wales Steel Corp.'s new Abbey Works at Margam. The plant, which opened this summer, is supposed to be turning out 100,000 tons of steel a quarter by the end of this year. The government is currently trying to determine just how much of this capacity can be used in light of the scrap shortage.

The government admits that the market for scrap in Germany is not going to expand, nor does it entertain any hopes of getting scrap from U.S. Steel, now nationalized, it has been under tight government allocation, virtually ever since before the war. A "D.O." licensing system is being worked out in addition.

Copper: Consumption has been restricted to 85% of monthly take during the first six months of 1950. The Ministry of Supply has complete control over supplies to first-line users. A list of prohibited uses has been published.

Improvement in the supply situation depends largely on the ability of Britain to boost the output of Southern Rhodesia's coal mines and therefore copper smelters. The government hopes that the International Materials Conference in Washington will be able to work out international allocations by the fourth quarter of this year.

Secondary users of copper have required a license since July 1.

Zinc: Consumption of all grades has been cut back to an average of 60% of the level during the first nine months of 1950. The Ministry of Materials is sole buyer of imported zinc. Users must have a license. A Prohibited Uses list is in effect.

Further cuts, ranging from 20% to 50% are expected before the end of the year. Even if IMC comes up with an allocation, the government sees no hope to avert restrictions. Some may be eased next year, "but we are not in sight of being able to satisfy all demands."

Nickel: Consumption was first cut back to 90% of 1950 averages, then a further cut to 70% in nickel for stainless steel and to 50% in supplies of anodes for plating was added. (Both figures relate to 1950 averages, of course.) No relief is expected even next year, when the government believes the IMC will come up with an international allocation.

These are the major metals that are seriously in short supply. To the list should be added tungsten, molyb-

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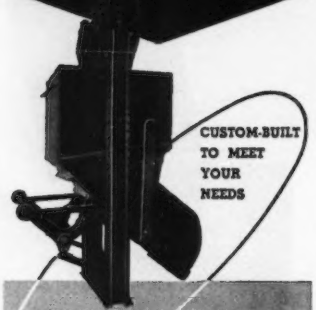

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WRITE FOR COMPLETE INFORMATION

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England *(Continued)*

denum and selenium, for which consumption cutbacks have not been published. Along with magnesium these metals are bought, sold, and distributed solely through the Ministry of Materials and the Ministry of Supply. (The former buys, the latter sells and distributes.)

Of the metals and minerals in easier supply,

Aluminum: Thanks to a long-term contract with the Aluminum Co. of Canada, an increase of 2,000 tons a month in allocations has been made possible. Considering earlier cutbacks in consumption, this means British users are getting more than they got, on the average, in 1950.

Sulphur: IMC allocations have considerably alleviated the sulphur shortage that panicked the country last spring. Consumers are getting about 85% of their 1950 allocation at present. Chemical Industries are getting about 90%; fertilizer makers only about 55%; rayon makers about 85%.

Lead: Outlook is complacent. Lead is restricted in consumption, but no further action is expected.

GERMANY

★**A submersible sludge pump, fitted with a specially-built electric motor** for underwater operations, was shown for the first time at this year's German construction fair, CONSTRUCTA, at Hanover.

The unit consists of a sludge-water, centrifugal pump with directly coupled underwater motor in a vertical position. The motor is watertight; flooding of pump and motor is immaterial since the unit works perfectly in a submerged position.

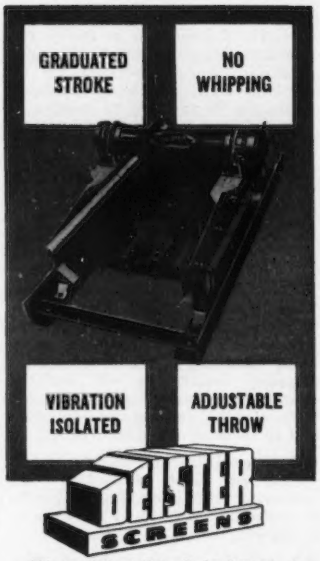
Of great advantage is the fact that nearly complete drainage of the pit is possible because the pump is under the motor. Because the pump itself is continuously under water, the suction line is eliminated. Comparatively low weight and space requirements enable use of the equipment on a wide range of projects.

Technical Data	Type KS 50	Type KS 80
Capacity, US gal/min	55-110	66-152-220
Total head	66-132	80-160-265
Motor	4 hp	6 hp
Pipe connection cl. dia.	2"	3"
Weight (pump and motor)	210 lbs.	225 lbs.

Each unit is usually equipped with a 65 ft. electric cable. The motor can be operated on 220 or 380 volts; on request it can be supplied for any voltage up to 500 volts. The equipment is produced by EMU, Unterwasserpumpen G.m.b.H., Hof, Germany.

SWEDEN

★Shipments of iron ore through the north Swedish port of Luleaa are expected to reach 3.5 million tons this season.



This new Deister Sharp Stroke Screen is designed to handle damp, sticky material without blinding. Stroke is longer, speed is far higher, construction follows aerodynamic principles. Head motion is demountable, and interchangeable, as a complete unit. For complete information write for Bulletin No. 53.

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By lining the inside of ore cars with Royalite® rubber, "U. S." engineers now prevent the accumulation of ore in the cars. Result: Maximum ore car capacity and elimination of valuable man-hours needed to remove the ore. This is one of the many ways by which United States Rubber Company technicians enable the mining industry to attain higher volume per shift at lower cost per ton. U. S. Royalite is also used in pad form to dissipate shock resulting from impact; and in sheets to combat wear caused by abrasive materials. For more information write to address below.

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LOADING IRON ORE into car. The ore no longer adheres to the inside of the car—thanks to U.S. Royalite rubber linings.

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Write for Bulletin 500

Sweden *(Continued)*

Iron ore trains are running at the rate of nine or ten a day from the interior to the port. Shipments from the port amount to between 30,000 and 35,000 tons a day, and to date this year total about 1.8 million tons.

Efforts are being made to speed up loadings because shipping firms held back tonnage in May and June in the hope of higher freight rates.

IN MEXICO

Mexico will mint silver coins for West Germany

★**Mexico is soon to mint 40,000,000 one and five-mark silver pieces for Western Germany** under the pact Lic. Carlos Novoa, director general of the Bank of Mexico, made with the Bonn Government during his recent visit to Europe. This initiates a series of such mintings, reportedly worth between $15,000,000 and $20,000,000. Pakistan is negotiating with Mexico for a considerable silver minting.

★Systematic working of the national metal and mineral reserves by the Government and small-scale miners is the aim of a bank the National Economic Recuperating Association, Ing. Rafael Arroyo Alejandre, president, has asked President Miguel Aleman to establish. The bank, to be capitalized for 125,000,000 pesos ($14,100,000), would specialize in exploiting important gold deposits throughout Mexico, stressing those in Baja California, Sonora, Sinaloa, Michoacan and Guerrero. Four large refineries for gold and silver ore it would install and operate would exclusively service the national monetary reserve. "None of the gold and silver thus obtained would be exported," the Association insisted. The bank, with the Bank of Mexico, would mint from the refineries' yield coins of high gold and silver content. Within five years, gold the scheme produces would enrich the national monetary stock by at least 10,000 million pesos, the Association estimates, remarking, "that would give Mexican money a just value and do much toward equilibrizing Mexico's economic balance." The bank would keep 55% of its liquid revenues and use the rest for exploiting the metal and mineral reserves and financing small-scale mining.

★The **sulphur plant Petroleos Mexicanos (Pemex),** the official oil company, recently opened at its Poza Rica oil fields on the Gulf coast, is now **producing 140 metric tons daily.** Pemex hopes to hike the plant's production to 200 tons daily by the end of this year. The company, reportedly, is organizing a geological unit to seek sulphur as well as oil deposits. The unit will examine salt domes in Vera

R. G. LeTourneau, Inc.

Not, PLEASE, In the Name of Fairness

Our national Office of Economic Stabilization has adopted a policy of gearing wages to the cost of living. We are told that "escalator clauses," which provide that rates of pay shall be adjusted to take account of changes in the cost of living, will be generally approved.

If the adoption of this policy had been announced as a frank concession to political expediency, it would have been quite understandable. There may very well be votes, lots of them, in a policy which purports to protect the income of a large group against loss through the price inflation caused by the defense program.

A case might even have been made for a policy of approving escalator clauses on grounds of production expediency. The leaders of some three million organized workers now covered by such clauses have indicated that they would fight to the limit to keep them and thus maintain "real wages,' that is, wages measured by their purchasing power. The leaders of other organized groups have indicated they would fight to get the benefit of such clauses. Denial of them might mean serious strikes.

Justified "in Fairness"

However, the policy of approving escalator clauses was not based on these relatively low grounds of expediency. It was justified on high moral grounds, on grounds of "fairness." In the words of the President's Council of Economic Advisers, "maintenance of real wages during inflation cannot in fairness be disallowed."

That proposition is false.

It would be truthful to say, "maintenance of real wages during inflation cannot in fairness be allowed."

The truth of the corrected proposition becomes evident immediately when you take a look at the basic nature of the inflationary problem created by defense mobilization.

We are devoting a large share of our national production to defense. The share is now scheduled to hit about 20% in 1952.

Since we are not able to increase our total production fast enough to meet defense needs

in addition to civilian needs, that means a cut in the supply of goods and services that is available for civilian consumption. But the money paid out for the production of defense materials is added to that which is available to buy civilian goods.

Thus, more money is put into the hands of the people to buy less goods. So prices go up. That is inflation.

If one group of people then is granted enough additional money to offset the price increases — and that is the purpose of an escalator clause — and thus can continue to buy as much as they have been buying right along, less goods will be left for other consumers who are not getting this advantage. That is palpably an unfair distribution of the sacrifices necessitated by defense mobilization. In fairness, therefore, maintenance of real wages in inflation cannot be allowed.

Organized workers were not the first, of course, to get the benefit of an automatic adjustment to take account of the increased cost of living. The farmers got theirs first. The price parity formula is, in essence, an escalator clause. The federal government underwrites increases in the prices of the things farmers sell in order to match increases in the prices of the things they buy.

Crucifying the Helpless

As matters stand, two groups are without benefit of escalator clauses. One group is composed of manufacturing firms. While they have not been nearly as successful as the misleading reports of "record-breaking profits" suggest, they have been able to look after themselves fairly well — thus far.

But one group is completely without protection. It is that numerically large but politically unorganized mass of people — many of them old and relatively helpless — who are trying to live on pensions, annuities and other fixed incomes derived from their savings. They are at the end of the line when the increased costs of inflation are passed along. They have no one to whom they can pass the buck. They are being progressively pauperized by the continuing inflation caused by progressive boosting of costs and hence prices.

With the present line-up of pressure groups in Washington, protection for the principal victims of inflation — those who have saved for a rainy day only to find inflation has blown away the roof — is obviously an extremely difficult business. But to have even temporary insulation against inflation granted to powerful groups in the name of fairness should be offensive to the nostrils of a nation that presumes to assert the moral leadership of the Western World.

The only really fair way to handle inflation is to prevent it. But once it is under way, fairness demands that the burdens be as evenly distributed as practicable.

An escalator clause — or a farm parity provision — is explicitly a device to enable the group favored by it to escape the burden of inflation. Whatever concessions we feel we must make to political pressures or production expediency, let us at least be honest enough not to invoke "fairness" as justification for so arbitrary a discrimination in the distribution of the defense burden.

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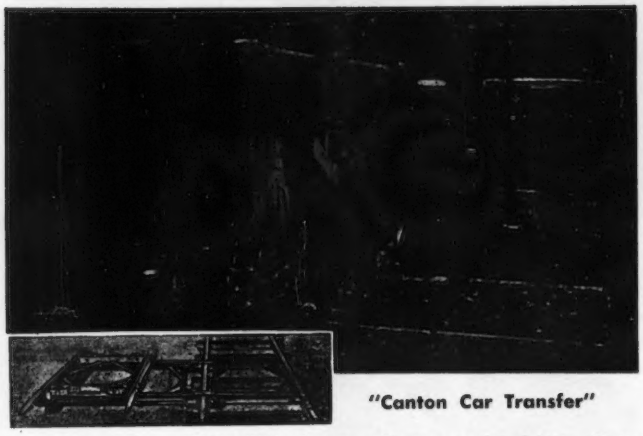

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Mexico *(Continued)*

Cruz. Pemex plans a sulphur plant at Jaltipan, Vera Cruz.

★U.S. Government action that gives brighter prospects for **increased sales north of the border** for Mexican copper, lead, zinc, magnesium, aluminum, iron, steel and scrap metal gratifies mining but also makes it moan. The grief is the old one: continuing underpar rail service. Mining complains that 10,000 tons of ore consigned to export as well as to the Mexican market is stalled at the mines not only because of rail deficiency but because of the lack of enough trucks for highway movement. The Government-administered National Railways, Mexico's major railroad, again points to more rolling stock operating and going into service, improving rights of way, swifter freight schedules. Truck operators blame high costs stemming from the 8.65-peso dollar and the necessity of importing practically all vehicles.

★**Several promising uranium and tungsten deposit discoveries** are being checked by the National Institute for the Investigation of Mineral Resources. The tungsten find was made by a prospector at Batopilos, Tarahumara District, Chihuahua. The Institute indicates that if proved this deposit will be placed in the specially guarded, including troops, reserves for uranium. A uranium deposit was encountered near Susucato, Zitacuaro District, Michoacan, by a prospector whom the Institute named as Enilio Sanchez. Ing. Alfonso Martinez Berges, Oaxaca mining engineer-geologist, discovered two uranium deposits near Oaxaca City.

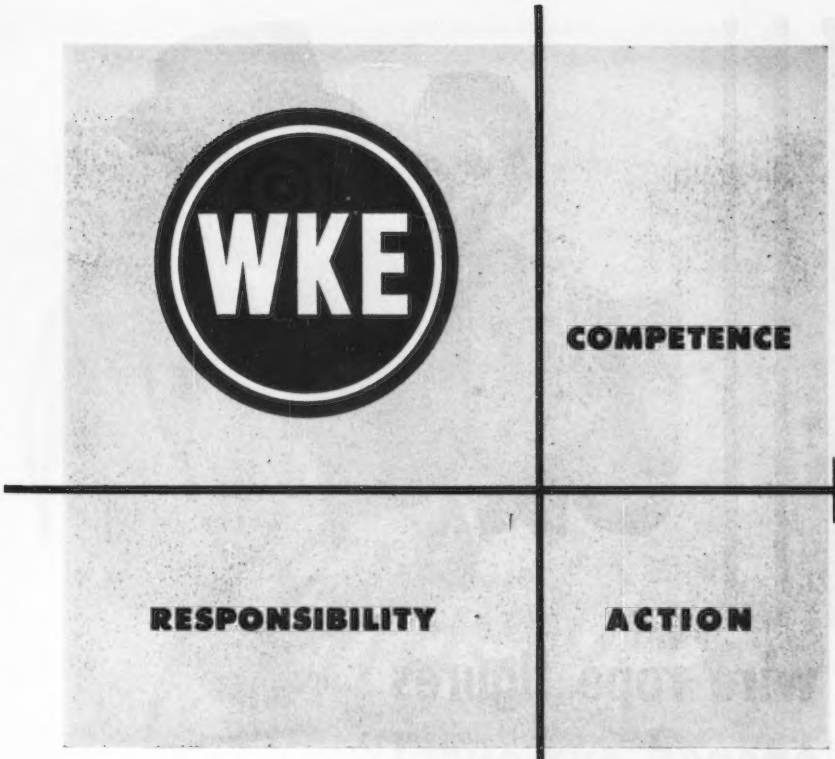
IN THE PHILLIPINES

Marsman's Coco Grove, Itogon resume production

★Gross value of the gold in July from the **five producing gold mines** of the Philippines **exceeded $1,037,000.** This total does not include by-product gold recovered at Lepanto Consolidated, which shipped copper-gold concentrates during the month valued at $778,000. The Benguet-Balatoc mines sent 74,750 tons of ore to the central mill for a recovery of $578,800 or an average of $7.75 per ton. For the first time in 1951, ore milled from Benguet exceeded that from Balatoc both in tonnage and value.

★After almost 10 years of shutdown, August marked the **return to production** of the first of the **Marsman group of gold mines** which were second in importance only to the Benguet group in the prewar period. Coco Grove, formerly most important gold dredging operation in the Orient, resumed operations with the dredge "Mary Angus" at Coco Grove in Paracale and is at present digging in the pay area. The dredge is under the direction of F. A. Nowacki, formerly general superintendent. Both dredges were badly damaged during the war, one irreparably so. The other was successfully repaired.

★A second Marsman operated mine, **Itogon,** in the Baguio district, **began hoisting ore once more in August** at the new 300-ton mill, and is now the third gold producer in the area. Full production is scheduled for September. J. B. Stapler is managing director for the Marsman companies, assisted by Clarence A. Weekley. Claude Ferteg is mine superintendent at Itogon. Alan D. West has a similar position at United Paracale and Arthur A. Harrow at San Mauricio. Both United Paracale and San Mauricio will resume work later in the year. Roscoe Cannon, formerly general superintendent for the Atok-Big Wedge company, resigned that position to become general superintendent for the two Paracale mines for the Marsman interests.



GET IT DONE

This favorite expression of WKE management characterizes the aggressive action and persistent follow-through necessary for top performance.

Project management by WKE provides you with experienced personnel and sound organization for design, engineering and construction of production facilities.

In the fields of coal preparation, iron beneficiation and metallic and nonmetallic mining, the WKE insignia stands for competence, responsibility and action — to "get it done" faster and better.

Consult the nearest WKE office or representative for complete information.

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WESTERN KNAPP ENGINEERING CO.
DIVISION OF WESTERN MACHINERY COMPANY
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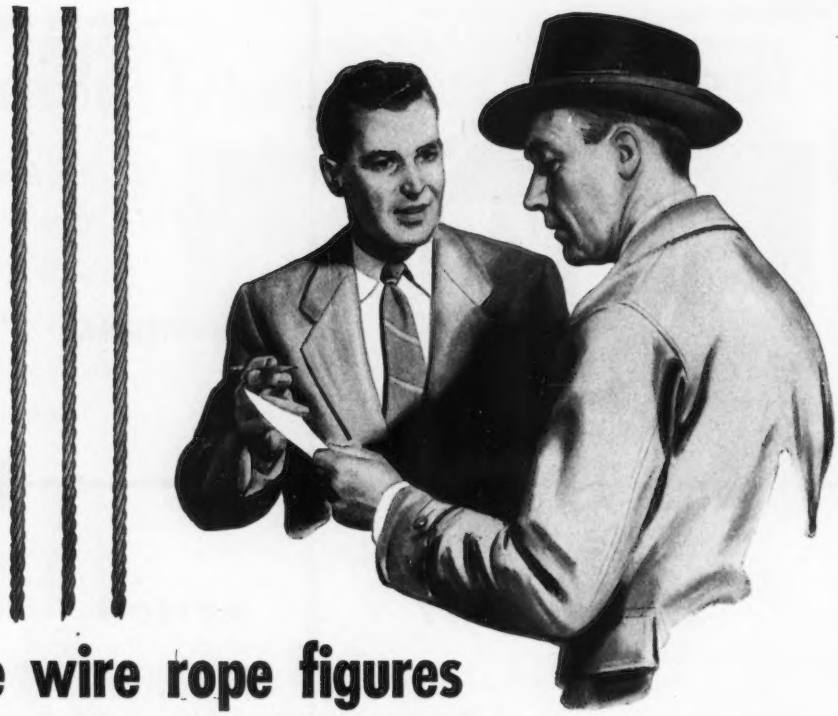

"These wire rope figures really opened our eyes!"

"Couple of years ago, the boss asked me to start checking our wire rope costs. He wanted a little system of records that would tell us what each rope was doing, and how much work we were actually getting from it. Figured we could learn the brand that would last the longest—and cost the least—on our type of work.

"So I started keeping track. In our case, the jobs involving rope boiled down to a matter of tonnages moved. Wasn't at all hard to record what each rope accounted for in its lifetime. When I'd been checking long enough for the figures to have some meaning, I showed 'em to the boss. By then I could tell which make of rope was doing the best job for us, costwise and every way. The figures really opened our eyes!"

These men weren't the first to learn the value of checking rope performance. Many users of Bethlehem wire rope follow the practice regularly. We're always glad to see it, for it enables actual comparisons between brands . . . and we know that in any such comparisons, Bethlehem rope will stand out from the crowd.

Here's a fair suggestion: over a period of time, stack the Bethlehem product against any other brands of your choice. Keep tabs on them all, and at intervals study your figures. Our guess is, those records of yours will prove beyond question the solid economy—the long-term economy—of Bethlehem wire rope.

BETHLEHEM STEEL COMPANY, BETHLEHEM, PA.

On the Pacific Coast Bethlehem products are sold by Bethlehem Pacific Coast Steel Corporation
Export Distributor: Bethlehem Steel Export Corporation

LET YOUR RECORDS TELL YOU!

Refractories

a good target for greater furnace production

Changes in furnace design and operation—aimed at greater production of metal—impose increasingly severe conditions upon the refractories of which furnaces are built. Higher temperatures, increased activity of chemical reactions, larger volumes of metal, slag and gases—these are some of the conditions that must be compensated for if accelerated production schedules are to be fulfilled.

Important benefits are derived from the use of such outstanding brands as the following:

CHROMEX B in copper refining furnaces and converters, lead refining furnaces and in aluminum melting furnaces.

H-W PERIKLASE in various furnace bottoms.

METALKASE in upper side walls and roofs of metallurgical furnaces.

FORSTERITE for basic roofs in electric furnaces and copper holding furnaces.

H-W MAGNESITE, MAGNEX, H-W CHROME and CHROMEX for various basic refractory requirements.

VEGA super-duty silica brick and **STAR** silica brick for roofs of refining and smelting furnaces.

Harbison-Walker Refractories Company
AND SUBSIDIARIES
WORLD'S LARGEST PRODUCER OF REFRACTORIES
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DIGGING FOR PROFITS?

They'll carry the load!

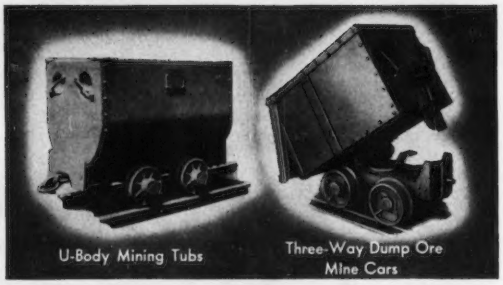
Here's mining equipment designed by men who have solved many difficult mining problems in many different parts of the world . . . mining equipment manufactured by a company with over 50 years' experience in serving the mining industry! Only a few examples of the many types of mine cars manufactured are shown here.

To mining engineers concerned with the increasing costs of mine operation, "Pressed Steel Car Company" equipment will give dependable, efficient, trouble free service.

For constructive help in solving your difficult mining problems consult our engineers.

Spiratube . . . the new flexible tubing for ventilation

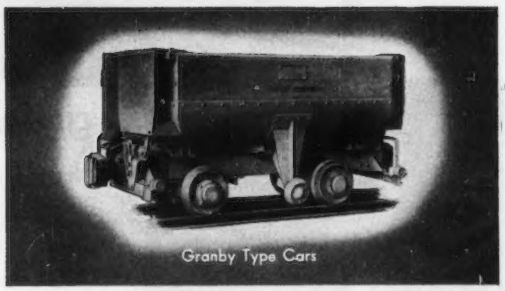
Mining Locomotives



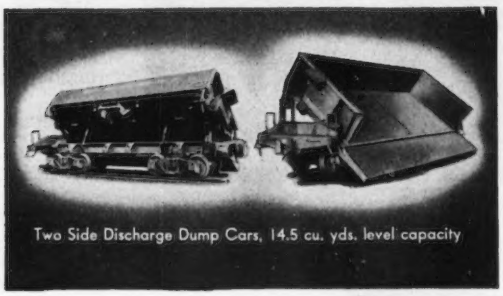
U-Body Mining Tubs

Three-Way Dump Ore Mine Cars

Track work and car parts



Granby Type Cars



Two Side Discharge Dump Cars, 14.5 cu. yds. level capacity

Other Products...

WEST VIRGINIA STEEL and MANUFACTURING CO.
Steel rails, steel crossties, track accessories, switches, crossings, frogs, etc.

THE FATE-ROOT-HEATH COMPANY
Brick manufacturing machinery.

PLYMOUTH LOCOMOTIVE WORKS
Internal combustion motor locomotives from 3 to 70 tons (alcohol, gasoline, Diesel and Diesel-electric).

WOOLERY MACHINE COMPANY
Weed burners, gang cars, rail motor cars.

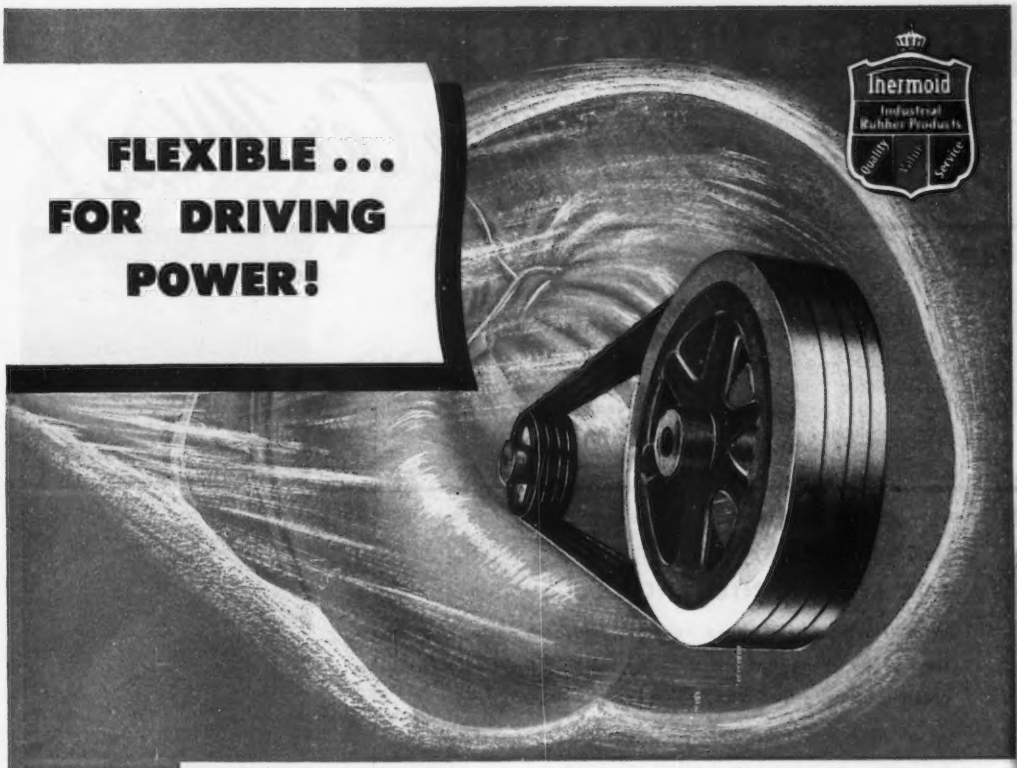
FLEXIBLE TUBING CORPORATION
Flexible Tubing.

PSC

Steelcar

PRESSED STEEL CAR COMPANY, Inc.

Export Division, 25 Broad Street, New York 4, N. Y.



FLEXIBLE . . . FOR DRIVING POWER!

Thermoid Multi-V Belts are pre-stretched . . .

they're flexible to insure maximum power transmission without adjustment. They are backed by over 70 years of engineering know-how . . . constructed to absorb repeated shock loads . . . thoroughly impregnated with special rubber compounds to withstand moisture and abrasion, resulting in longer belt life.

Thermoid Multi-V Belts are available in matched sets . . . uniform in size and cross section. Their longer life and non-slip performance add up to "Power . . . at the lowest cost per hour."

Your ***Thermoid*** Distributor can help you with your power belting problems . . . whether you need Multi-V, F.H.P. or flat transmission belts. For unusual belt problems, a ***Thermoid*** Field Representative is always available to give you the benefit of his experience.

FREE . . .
Write for free catalog No. 3678. Contains authentic data on how to choose Multi-V F.H.P. or flat transmission belting.

Conveyor & Elevator Belting • Transmission Belting
F.H.P. & Multiple V-Belts • Wrapped & Molded Hose

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THE S-D "FLOATER"...

America's No. 1 Mine Car Wheel!

"FLOATERS"

FOR FASTER . . . CHEAPER HAULING

Independent engineering firm tests prove that locomotives can pull up to 50% greater loads with no additional power requirement when cars are equipped with S-D "Floaters" instead of other types of precision bearing wheels . . . a big power and time saver!

"FLOATERS"

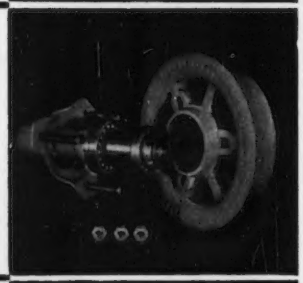
FOR LESS MAINTENANCE . . .

With "Floater's" solid closed front hub, and back double seal, grease stays in the wheel, dust and dirt stay out. Often "Floaters" require greasing no more than once in five years.

"FLOATERS"

FOR QUICK DEMOUNTABILITY

Any unskilled worker can remove and replace a "Floater" as easily as changing an automobile wheel. Bearings always remain in perfect adjustment on axle. When replaced there's no chance of pinching, misalignment, loose or tight bearings.



"FLOATERS"

FOR LONGER WHEEL LIFE

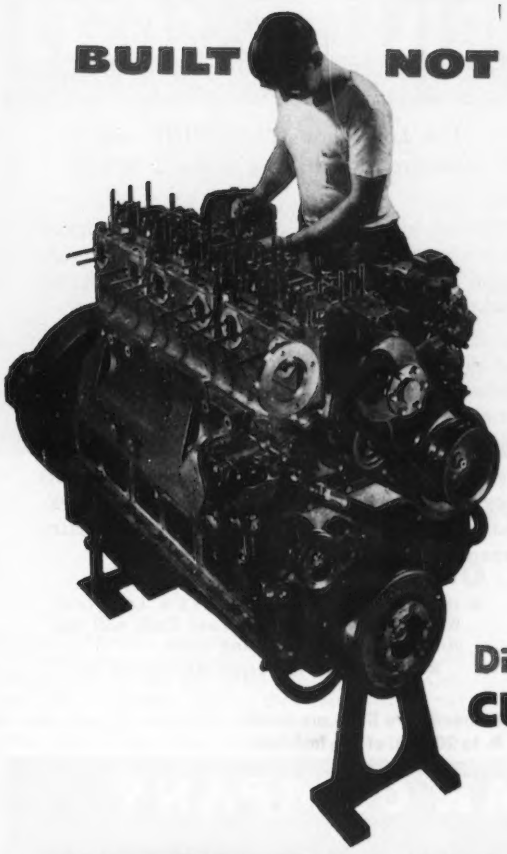
We believe our own special mixture of iron and exclusive heat treatment are responsible for making "Floaters" famous for their toughness and long wear . . . such quality is your assurance of perfect satisfaction.

Try S-D "Floaters". Check their savings. Experience proves that once an operator knows what "Floaters" will do for him, he specifies smooth-running "Floaters" for all wheel replacements. For complete information, write Sanford-Day Iron Works, Knoxville, Tenn.

SANFORD-DAY IRON WORKS

Cummins®
CUSTOM BUILT Diesels

BUILT NOT ONCE BUT TWICE



Each rugged, lightweight *and* high-speed Cummins Diesel is actually built *twice.* It's assembled, run-in tested, disassembled . . . inspected . . . then reassembled and tested again. And each engine is custom-built *to fit the job. Extra* care in building, Cummins exclusive fuel system, efficient service and parts organization, enable users to get *less* "down-time", *more* power and profits from Cummins Diesels. *See your Cummins Dealer.*

Diesel power by CUMMINS

CUMMINS Dependable DIESEL

Lightweight High-speed Diesel Engines (50-550 hp)
for: on-highway trucks
off-highway trucks • buses
tractors • earthmovers
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industrial locomotives
air compressors
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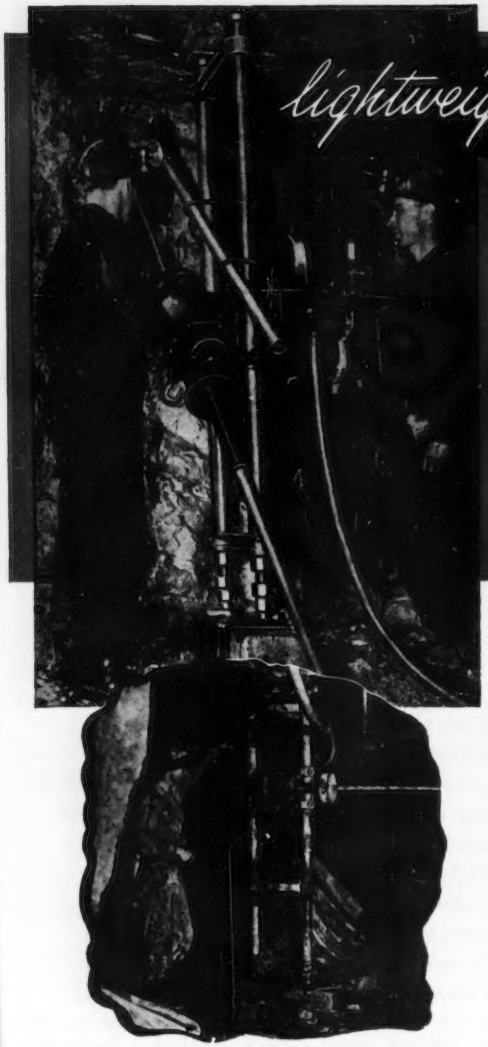
lightweight and **POWERFUL**

...the Longyear

WOLVERINE

DIAMOND CORE DRILL

CUTS UNDERGROUND DRILLING COSTS



The Longyear WOLVERINE is available with air or electric motor; screw feed or hydraulic head. It is furnished with drum hoist. Bit speeds up to 2500 R.P.M. Weight: (with air motor and screw feed) only 500 lbs. Capacity: 800 ft. of 1½ inch hole.

The Longyear WOLVERINE cuts underground drilling costs 3 WAYS

MOVING TIME IS REDUCED. This lightweight drill can be set up quickly. It can be knocked down for easier handling through narrow openings. The compact design of the WOLVERINE makes smaller drilling stations possible.

DRILLING TIME IS REDUCED because the powerful motor with 3 speed transmission provides either high speed for good drilling conditions or extra torque for long holes or tough going.

OPERATING COSTS ARE REDUCED. Balanced design reduces vibration and chatter . . . drill bits last longer. The best materials and workmanship in the WOLVERINE mean lower maintenance costs and longer drill life.

● INVESTIGATE THE 3 WAYS a Longyear WOLVERINE Diamond Core Drill will cut your underground drilling costs.

Write TODAY for revised Bulletin No. 71.

Other Longyear underground Diamond Core Drills are available with capacities from 300 ft. to 2000 ft. of 1½ inch hole.

E. J. LONGYEAR COMPANY

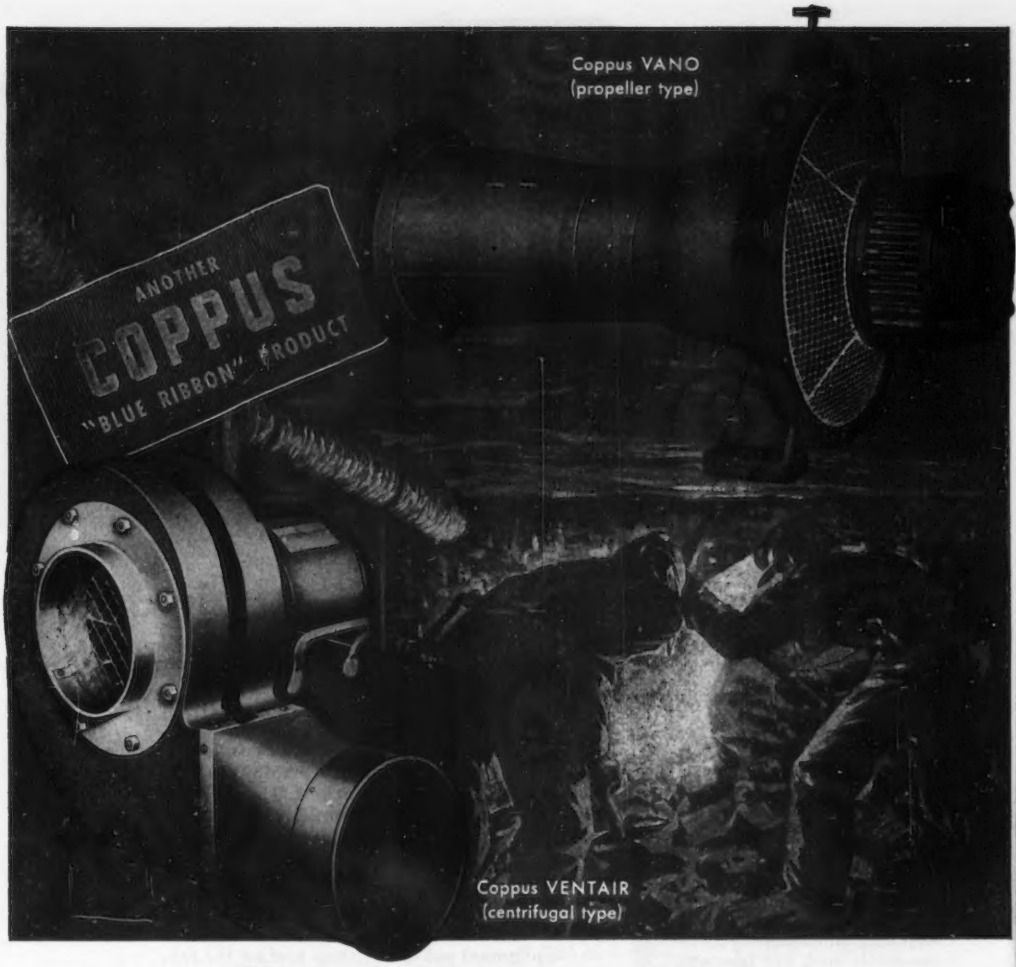
MINNEAPOLIS, MINNESOTA, U. S. A. NEW YORK OFFICE, 1775 BROADWAY

CANADIAN LONGYEAR, LIMITED, NORTH BAY, ONTARIO, CANADA

DIAMOND CORE DRILLS • CONTRACT CORE DRILLING

SHAFT SINKING • GEOLOGICAL INVESTIGATIONS

REPRESENTATIVES IN PRINCIPAL MINING CENTERS IN THE UNITED STATES AND OTHER COUNTRIES.



Choose Between Them and Get 30% to 100% More Air

Coppus Blowers are designed for two different types of mine ventilation requirements: the centrifugal Coppus VENTAIR is for long pipe lines; the propeller-type Coppus VANO for shorter lines . . . the correct selection will give you from ½ more to twice as much air — for a given power consumption — than an ordinary all-purpose fan.

Available for either compressed air or electric motor drive, both can be used as blowers or exhausters and are obtainable in capacities up to 90,000 CFM.

Only Coppus makes both these types, one of which will give you better, more economical mine ventilation . . . know them by the "Blue Ribbon" that symbolizes the engineering and production skill behind every Coppus product.

Representatives listed in MINING CATALOGS. Other Coppus "Blue Ribbon" products: steam turbines, gas burners, heat killers, air filters, blowers and exhausters for special purposes. See also THOMAS' REGISTER . . . Coppus Engineering Corporation, Worcester 2, Massachusetts.

COPPUS ENGINEERING CORPORATION
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Please send.....Bulletin 130

Name .....

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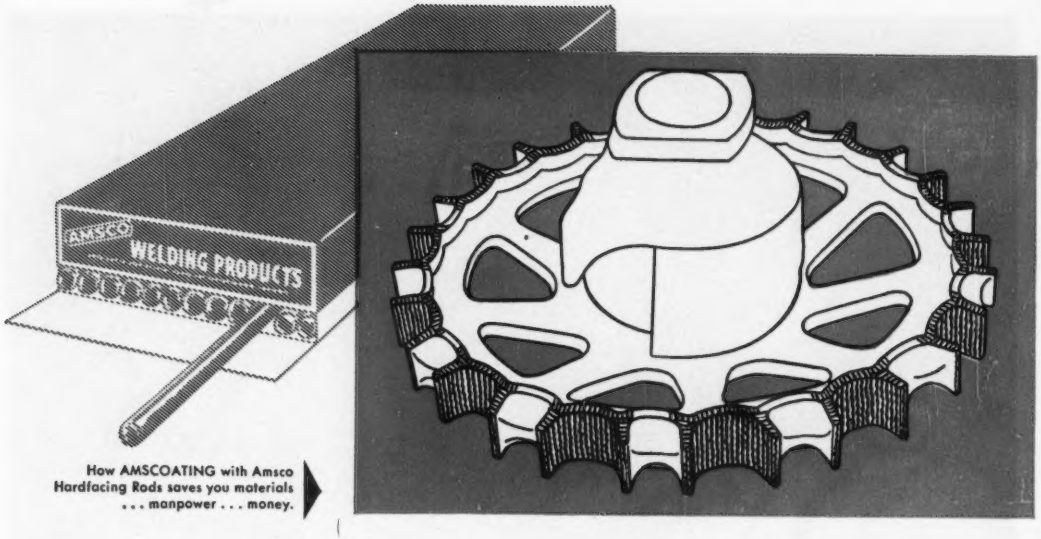

How AMSCOATING with Amsco Hardfacing Rods saves you materials . . . manpower . . . money.

These teeth take bites out of repair costs!

AMSCOATING can make old Tractor Drive Sprockets last 3 times longer than new.

Here's another way to beat the high cost of replacements, down-time and maintenance . . . AMSCOATING the teeth on Tractor Drive Sprockets. Time after time service records have shown that AMSCOATING of sprockets results in these dollar-saving advantages:

1. ***On an average — 3 times the service life of a new, unhardfaced sprocket.***
2. ***2 out of 3 sprocket changes completely eliminated . . . far less down-time, less maintenance . . . more equipment out of the shop and on the job.***

To top it off, sprocket replacements can practically be eliminated. An AMSCOATED sprocket can be reclaimed over and over again . . . *at about half the cost of a new one!*

Get all the facts on how to make these big savings . . . write today for instruction sheet on AMSCOATING sprockets, and the name of your nearest AMSCO Distributor.

AMSCOATING...stands for control of wear by Hardfacing...

Hardfacing rods—and recommendations for their use—are as sound as the manufacturer who makes them. AMSCO has been fighting wear for a half-century—first with Manganese Steel, and later with AMSCO Hardfacing Products.

If you have a problem of wear caused by impact, abrasion, heat or corrosion . . .

Find out how AMSCOATING can save you materials . . . manpower . . . money!

AMSCOATING
THE RIGHT WAY TO SAY HARDFACING

AMERICAN Brake Shoe COMPANY

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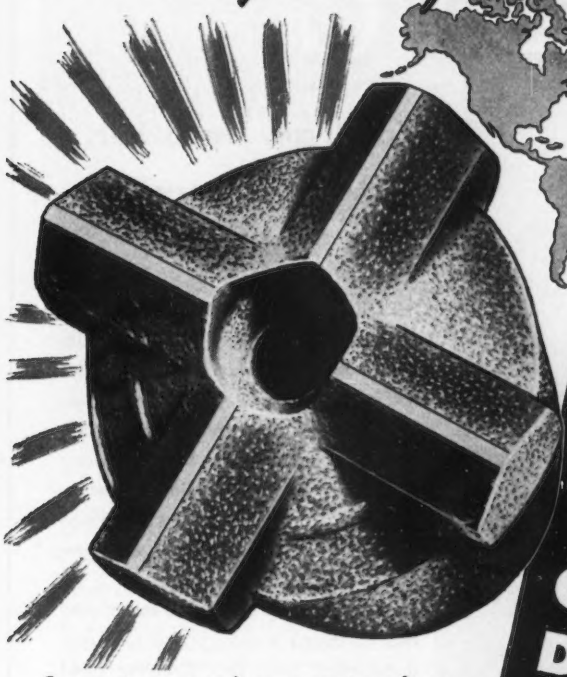
Other Plants: New Castle, Del., Denver, Oakland, Cal., Los Angeles, St. Louis. In Canada: Joliette Steel Division, Joliette, Que.
Amsco Welding Products distributed in Canada by Canadian Liquid Air Co., Ltd.

In every Mining Country *

Except for countries behind the Iron Curtain. P & M bits are in use in every country where mining operations of any account are carried on — 26 of them.



P&M ONE PASS DRILL BITS

with Waterland and Padley & Morgan patented features

A great many mine operators have proved the truth of our claims of lower cost drilling with the P & M bit. It's simple—it's fast—it's foolproof—and it wears well. You can prove it for yourself by asking for a demonstration against any competing product at your property.

• OFFSET GAUGE • THINNER WINGS • FLATTENED POINTS

Offset gauge reduces gauge bearing surface.

Hayes P & M bits are made in 3 and 4 wing types.

Flattened points increase strength of corners and resist reversing of reaming angle.

Stronger corners permit of narrower wings and smaller area of reaming face.

Representatives: Industrial & Commercial Supply Company, 544 Powell St., Vancouver, B. C.; General Sales & Equipment Co. Limited, 195 Main St., Winnipeg, Manitoba, Mr. George MacLeod, Noranda, Quebec; Construction Equipment Co. Limited, 404 Old Weston Road, Toronto, Ontario; Construction Equipment Co. Limited, 180 Vallire St., Montreal, Quebec; Construction Equipment Co. Limited, 115 Lower Water St., Halifax, N. S.; Hrap & Partners (Nfld.) Limited, 243 Water St., St. John's, Newfoundland, Thomas M. Nieves y Cia. S. A., Manuel Ma Contreras 58, Mexico, D. F.; Western Machinery Company, N. 808 Division St., Spokane, Washington.

HAYES STEEL PRODUCTS LIMITED

MERRITTON, ONTARIO, CANADA

Please send me full information on your P & M Bits

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COMPANY _____

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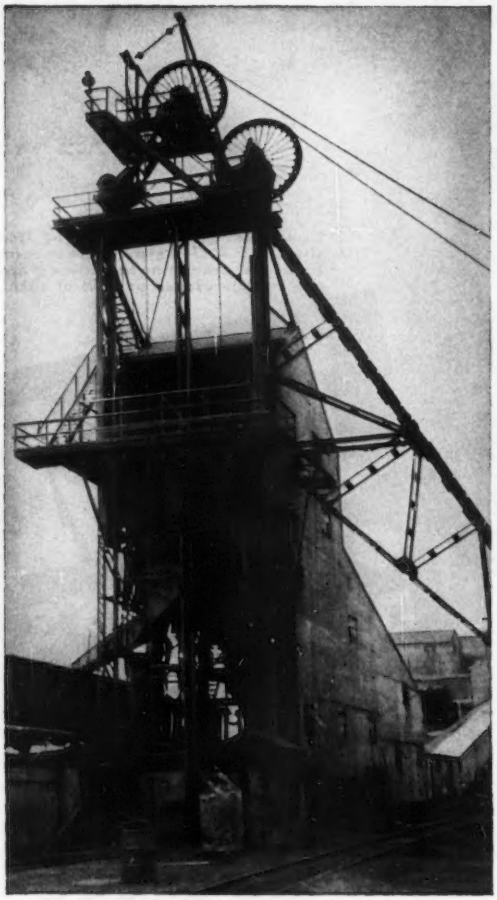
Hayes

WIRE ROPE



You'll get smoother, cost-saving service with Roebling

"BLUE CENTER" STEEL wire rope is an exclusive Roebling development. Its high resistance to abrasion, shock and fatigue spells long life. In addition, Roebling Preforming gives you a rope that is easy to handle... has better spooling qualities... reduces vibration and whipping. This combination makes Preformed "Blue Center" Steel Wire Rope a top performer on the job.

Roebling makes a complete line of wire rope... there's a construction for every installation. Have your Roebling Field Man help choose the *right* rope for your equipment. Get his advice on the correct use and maintenance of wire rope. It is based on performance records on thousands of installations. John A. Roebling's Sons Company, Trenton 2, New Jersey.

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Steel

BULWARK OF FREEDOM, AND...

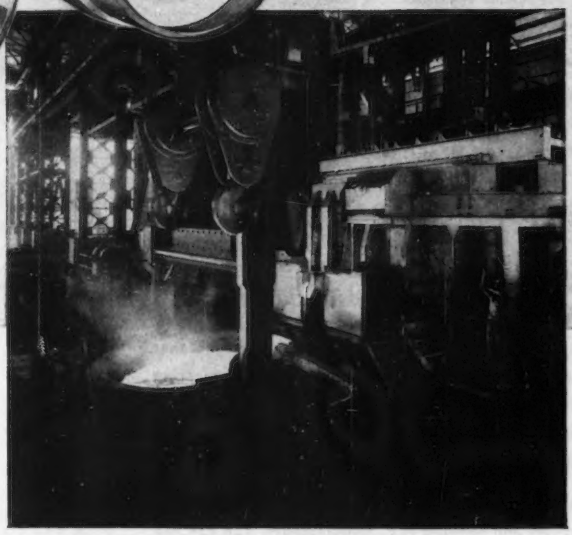
MORE steel—100 tons more steel every 5 hours. That is what the new electric furnace, pictured at the right, added in August to your at-home steel-making capacity.

Still another of these new, fast steel-making furnaces will be operating at year's end to double this capacity increase. Another blooming mill and auxiliary equipment will also be completed at Sheffield mills.

Yes Sheffield is doing more than its share to enable America to continue to use twice as much steel as all the rest of the world and keep on forging the highest level of better living the world has ever known.

In the past 10 years Sheffield has more than doubled your at-home steel-making capacity. In the same period of time, the steel industry as a whole has increased about one-fourth.

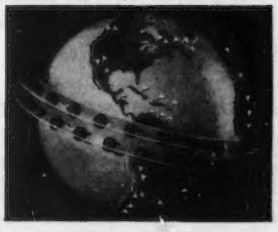
West of the Mississippi and East of the Rockies—Sheffield's primary trade territory—steel-making capacity is looming larger and larger, to meet your needs and make a larger contribution to the industrial growth of the region.



SHEFFIELD STEEL CORPORATION
HOUSTON KANSAS CITY TULSA
SUBSIDIARY OF ARMCO STEEL CORPORATION

SHEFFIELD MOLY-COP T.M.
COPPER-MOLYBDENUM ALLOY
Grinding Balls

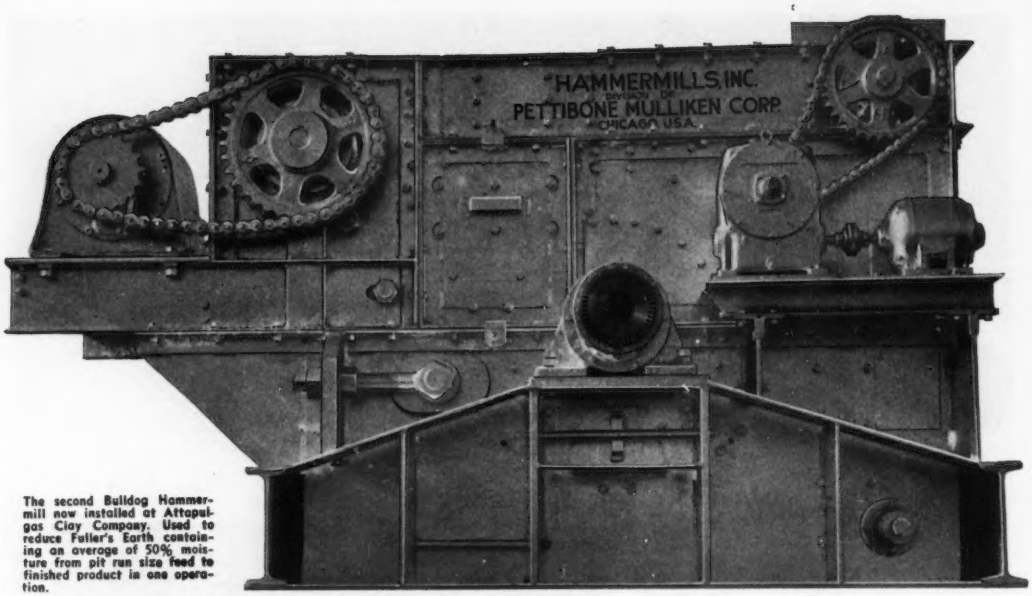
USED and PROVED ALL AROUND THE WORLD



IRON AND STEEL *SCRAP* MEANS.....

MORE STEEL FOR AMERICA
More Money In Your Pocket!

GET YOURS OFF TO THE DEFENSE LINES NOW!

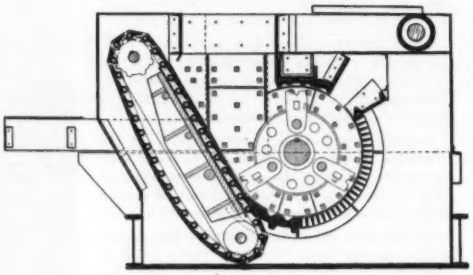


The second Bulldog Hammermill now installed at Attapulgas Clay Company. Used to reduce Fuller's Earth containing an average of 50% moisture from pit run size feed to finished product in one operation.

BULLDOG HAMMERMILL

with moving Breaker Plate

For wet, sticky material reduction . . . for those tough, heavy-duty crushing jobs.



Illustrated above is the last word in Moving Breaker Plate Hammermill design. It is built by an engineering organization whose experience far surpasses any organization that might furnish Moving Breaker Plate crushing equipment.

Design Improvements have increased reduction efficiencies and lowered H.P. requirements. You can see this equipment in operation at any time. Also Hammermills will gladly survey your reduction requirements and recommend the proper equipment without cost or obligation. Just write or call.

Bulldog Hammermills are built in capacities up to 1000 tons per hour for every purpose: for primary, secondary, fine reduction of materials such as limestone, shale, Fuller's Earth, phosphate muck, phosphate mud balls, iron ore, oyster or clam shells, any reducible material.

HAMMERMILLS, INC. • 4780 W. Division St.
Chicago 51, Ill. • Phone Spaulding 2-9300

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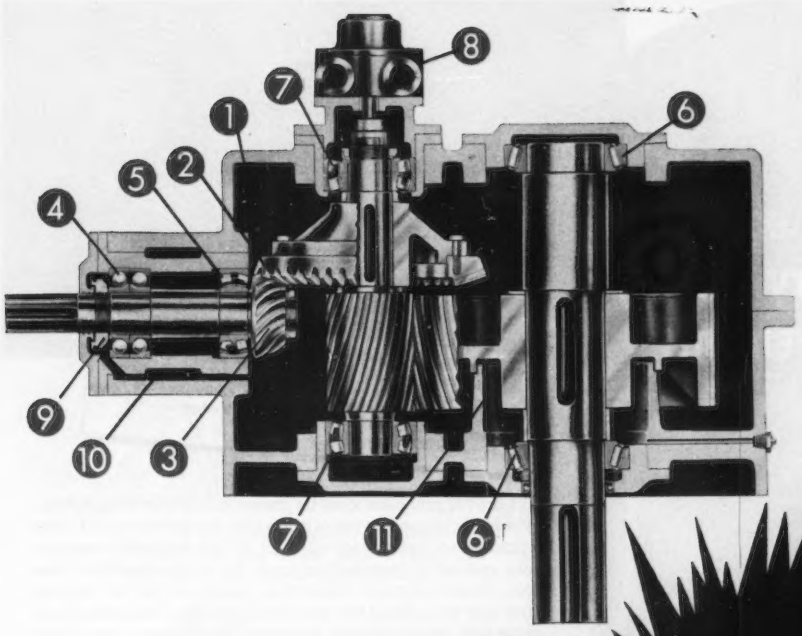
HAMMERMILL CHICAGO **HAIGS NEW YORK** **UNIVERSAL CEDAR RAPIDS**



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. . . make us tell you the "11 points" of superiority of PHILADELPHIA SPIRAL-BEVEL REDUCERS

These Units offer a dependable means of transmitting power at right angles (either horizontally or vertically). They're available in single, double and triple reductions . . . ratios ranging from 1.5 to 1 up to 238 to 1. Hundreds are in daily use throughout Industry. Send for Catalog SB-50 and kindly use your Business Letterhead when requesting it.

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Industrial Gears and Speed Reducers
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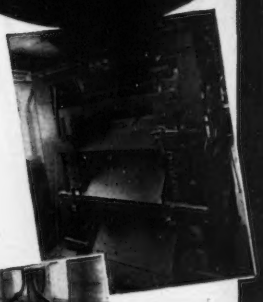
DINGS magnetic equipment for every mining requirement!

Dings Rectangular Electromagnet provides maximum iron removal above belts or chutes. Triple pole design for great magnetic strength and depth of penetration. Maximum magnetic strength across entire magnet face. Easily installed in any position. Low operating cost . . . trouble free . . . complete range of sizes.



(Right) Induced Roll Separator purifying sand.

Battery of Crockett Separators concentrating magnetite. (Left)

Magnetic Detector signals presence of tramp iron. (Right)

NEW, powerful Cross Belt Separator — with higher selectivity—for concentration and purification (Above)

NEW, powerful, non-electric Alnico Perma-Pulley for purifying, cobbing, protecting crushers, pulverizers, etc. Magnetic permanence guaranteed for life of installation. (Above)

Wherever crushers must be protected against tramp iron, wherever magnetic separation can contribute to the beneficiation of ores, you will find Dings magnetic separators specially designed to meet the requirements of the job. Dings magnetic separators have played an important role in making the extraction of many minerals possible and economically feasible. Shown here are a few of the machines which Dings has pioneered exclusively for the mining industry for the following purposes:

CONCENTRATION—everything from specially designed pulleys for cobbing nickel ores to powerful induced roll and cross belt separators for concentrating manganese, tungsten, chrome, titanium and many other minerals.

PURIFICATION—removing small amounts of feebly magnetic impurities with super high intensity separators. Minerals treated include feldspar, silica sand, salt, bauxite, barytes, nepheline-synenite, gypsum.

CRUSHER PROTECTION—magnetic pulleys, pulley type separators, drums, suspension magnets, spout magnets and magnetic detectors are all widely applied for arresting tramp iron ahead of crushing equipment.

WET TYPE SEPARATORS—Dings has pioneered in the development of wet type separators for concentrating magnetite and for use in new processes for concentrating low grade ores. *Ask for complete details of Dings Separators for Heavy Media Process Plants.*

Take advantage of Dings equipment and experience. For practical recommendations, submit your requirements with 25 lb. samples of material to the Dings Laboratory for testing and analysis. Literature on request.

DINGS MAGNETIC SEPARATOR CO.

4716 W. ELECTRIC AVENUE, MILWAUKEE 14, WISCONSIN

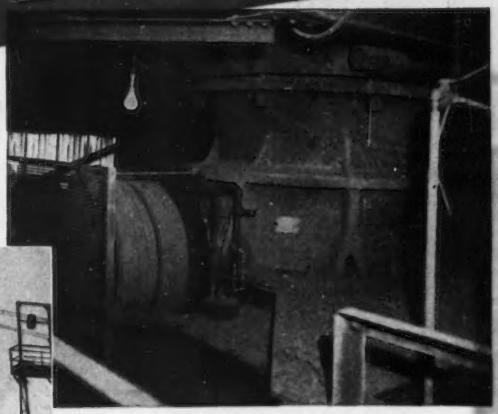
"Magnetic Separation Headquarters Since 1899"

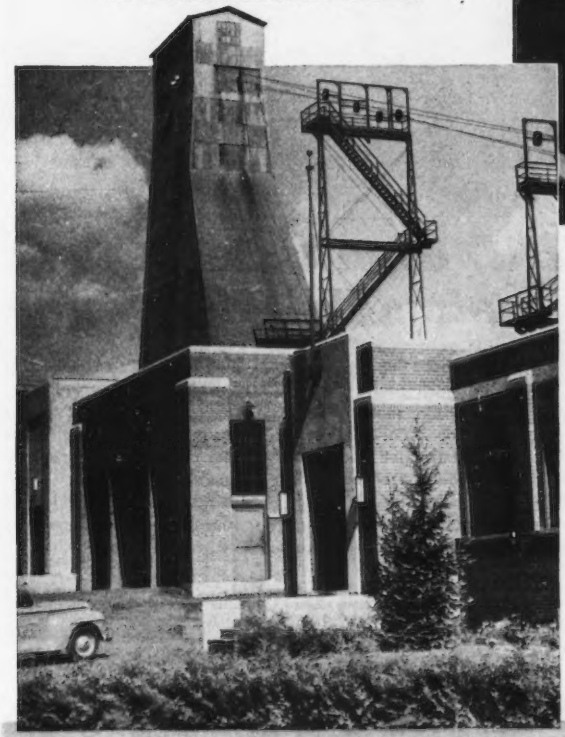
Dings

"HIGH INTENSITY"

OVER 3,000,000 TONS HAVE BEEN CRUSHED by this TELSMITH

The 13-B Telsmith Gyratory Crusher is located in the upper part of the 135-ft. steel headframe shown below.





● An important iron ore producer in the Iron River district of the Menominee Range in Michigan finds his Telsmith Gyratory Crusher to be exceptionally economical.

Installed in 1942, this Telsmith 13-B Crusher handles about 35,000 tons of ore per month, and to date has crushed over 3,000,000 tons. Crusher upkeep expense has been exceedingly low, consisting of only one set of eccentric bearings and some very minor parts. For details on Telsmith's bigger capacity and lower upkeep, get Bulletin 271.

Min.-34

SMITH ENGINEERING WORKS, 502 EAST CAPITOL DRIVE, MILWAUKEE 12, WISCONSIN

Cable Address: Sengworks, Milwaukee

Samuel Osborn (S. A.) Ltd., Johannesburg, So. Africa • Armco International Corp., Buenos Aires, Argentina
51 East 42nd St., New York 17, N. Y. — 211 W. Wacker Dr., Chicago 6, Ill. — Mine & Smelter Supply Co., Denver 17, Colo. — Mines Eng. & Eqpt. Co., San Francisco 4, Calif.
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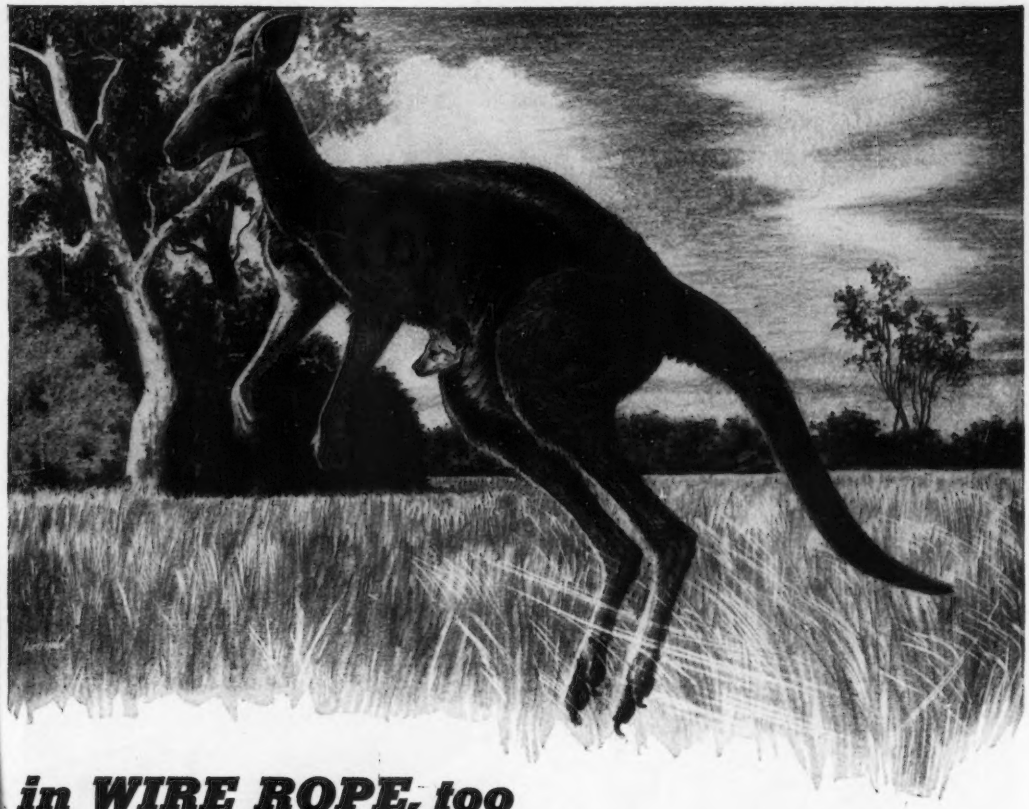

in WIRE ROPE, too the RIGHT KIND of muscle makes the difference

Endowed with highly specialized leg muscles, the kangaroo is able to make tremendous flying leaps—even with Junior perched in the rumble seat.

In wire rope, too, specialized jobs call for specialized muscles. That's why in Wickwire Rope we make sure you always get the proper combination of physical properties to best resist the destructive forces found on your particular job—whether it be abrasion, load strain, shock stress or bending fatigue.

Wickwire Rope gives you the benefit of long experience and specialized know-how which assures you of exactly the right kind of rope your particular job demands.

For additional information write or phone our nearest sales office.

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THE YELLOW TRIANGLE
ON THE REEL

THE COLORADO FUEL & IRON CORPORATION—Abilene (Tex.) • Denver • Houston • Odessa (Tex.) • Phoenix • Salt Lake City • Tulsa
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PRODUCT OF WICKWIRE SPENCER STEEL DIVISION
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5 reasons why modern mines buy Willison Automatic Couplers

1 SAFE

Willison Automatic Couplers require no manual assistance... no need for men to go in between cars to couple or uncouple a Willison Automatic!

2 FAST

All Willison couplers have the same contour... can be coupled at either end of car or locomotive . . . no time-consuming reversing is necessary.

3 STABLE

Close coupling of Willison couplers eliminates damaging slack... permits higher speeds with maximum stability... reduces surging and spilling.

4 PROTECTIVE

Two parts, the head and the lock, do all the work on every Willison coupler . . . take the shocks and strains to protect cars and locomotives from damage.

5 PROVED

Over 50,000 Willisons speed handling and cut costs in mines and industrial plants everywhere. Why not specify Willison Automatic Couplers for your haulage needs?

WRITE TODAY for circulars No. 1746 and No. 5240 for more information on Willison Automatic Couplers. National Malleable and Steel Castings Company, Cleveland 6, Ohio.

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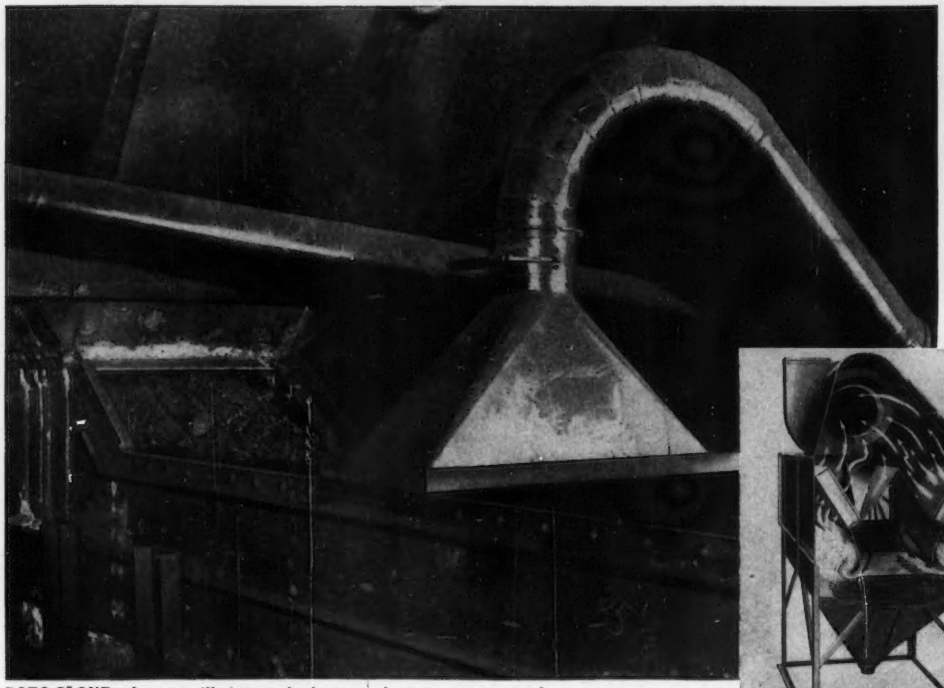
NATIONAL MALLEABLE and STEEL CASTINGS COMPANY

WILLISON AUTOMATIC COUPLERS • NACO STEEL WHEELS • NACO STEEL LINKS and SWIVEL HITCHINGS

today's best buy is better air!



ROTO-CLONE exhausts oscillating pan feeder even when covers are removed.

Cross section of Type N ROTO-CLONE arrangement D with dual impeller showing water curtains created by air flow. Dust collected in hopper may be sluiced either continuously or intermittently.

what happened to the dust?

ROTO-CLONE Dust Control Is the Answer to Lower Operating Costs.

Never give dust a break . . . if you want to maintain low operating costs. ROTO-CLONE'S high efficiency dust control for mining operations soon proves that *clean air* is a sound investment.

By eliminating a source of excessive dust the Type N ROTO-CLONE installation shown above has raised job morale, improved mechanical efficiency and reduced maintenance and cleanup expense to a minimum. Other ROTO-CLONE installations also salvage valuable material from milling, sampling and sintering operations. These add up to important savings on operating costs.

The many types, sizes and arrangements of ROTO-CLONES have solved almost every dust problem in the mining cycle. If dust sources are adding to your operating costs write for Engineering Bulletin 277 containing full details on Type N ROTO-CLONE.

**ROTO-CLONE* is the trade-mark (Reg. U.S. Pat. Off.) of the American Air Filter Company, Inc., for various dust collectors of the dynamic precipitator and hydro-static precipitator types.*

AAF **American Air Filter**
COMPANY, INC.
193 Central Avenue, Louisville 8, Kentucky • In Canada: Darling Bros., Ltd., Montreal, P. Q.

THEY GO TOGETHER...

MOBILE MINING EQUIPMENT...

and

HAZACORD TWIN PARALLEL CABLE

Locked Tight
FOR LIFE
Interlocking construction permanently bonds conductors, insulation and sheath into one integral mass...prevents internal slipping, prevents premature cable failure.
HAZAPRENE ZBF SHEATH

Mining's rugged work...it takes skilled men, specialized equipment—and the toughest cable made.

Hazacord Twin Parallel Mining Cable is engineered throughout for this exacting service. Notice the tough Hazaprene Sheath...vulcanized under pressure in continuous metal molds, it has the smooth finish, density, resistance to flame, moisture, abrasion and tearing required for safety and long life. It completely encases each insulated conductor, forming an extra cushion and protective barrier between the conductors in Type W and between the power and grounding conductors in Type G.

Notice the flat, compact design...the interlocking construction...the non-rotting, moisture-resistant open braided reinforcing cord...the long-aging tough rubber insulation. Hazacord Twin Parallel Mining Cable is designed for rugged duty...for long-lived performance that means extra economy. Approved by Pennsylvania Department of Mines and accepted by U. S. Bureau of Mines—"P-104BM" is molded into sheath at frequent intervals. Write today for complete information on Hazacord Twin Parallel Cable or ask your Hazard representative for the full story. Hazard Insulated Wire Works, Division of The Okonite Company, Wilkes-Barre, Pa.

HAZARD insulated wires and cables for every mining use

MINING and MILLING EQUIPMENT by ROGERS JOPLIN

Increased capacity... uniform flow... reduced maintenance.

Drill Jumbos
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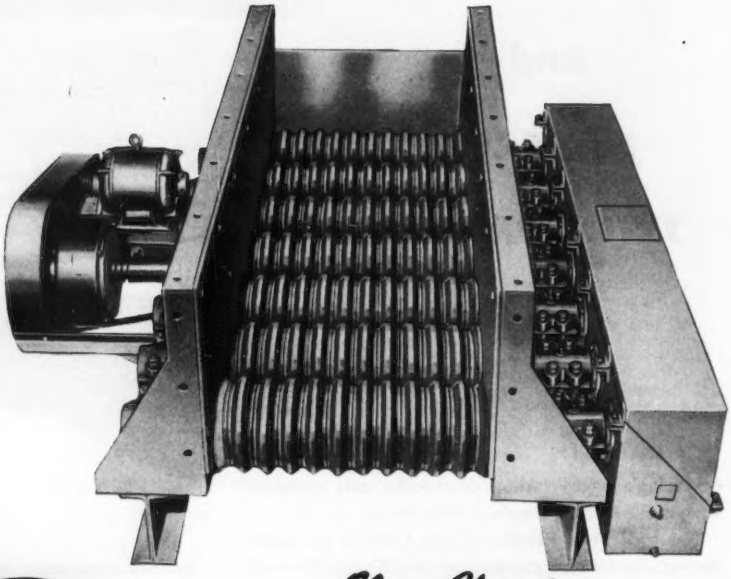

ROGERS IRON WORKS COMPANY

Joplin, Missouri

Non-Clogging LIVE ROLL GRIZZLY

From the Rogers Drill Jumbo at the working face, to the drag scraper, portable ramp loader, ore hoist... over the grizzly (shown above) and apron feeder, and on through the crushing and screening plant to the mill bins... Rogers-built, dependable equipment is designed to assure a continuous flow of material.

The Rogers Live Roll Grizzly, for instance, is an excellent scalping device... efficient and economical to operate. It's non-clogging, handles a wide variety of sizes and materials, and may be used in many feeding and separating operations.

Write for detailed information today on the Live Roll Grizzly and other dependable Rogers equipment.

Saving weight and space was vital in the building of this vacuum tank truck—used to pump and haul away mud, water and waste oil from sump holes at drilling wells and refineries. Speedaire helped solve that problem. Photo courtesy of Associated Oil Co. of California.

SPEEDAIRE on sump truck saves $315

POWER is transmitted from the engine to the vacuum pump of this oilfield sump truck by a Speedaire unit. For this special job, a fan-cooled speed reducer is ideal. It affords a 3-way saving: it saves 650 pounds, or 54% of the weight; saves 6.1 cubic feet, or 61% of the space occupied; saves $315, or 34% of the initial cost of a conventional worm-gear drive.

Speedaire is Cleveland's fan-cooled worm-gear speed reducer. Because it is fan-cooled, Speedaire does more work—delivers up to *double the horsepower* of standard worm units of equal frame size, at usual motor speeds. It can be installed economically on many applications where other types have been used heretofore—giving you the advantage of a compact right-angle drive. Speedaire gives the same long, trouble-free service characteristic of all Clevelands.

For full description, send for Catalog 300. The Cleveland Worm & Gear Co., 3281 E. 80th St., Cleveland 4, O.

Affiliate: The Farval Corporation, Centralized Systems of Lubrication.
In Canada: Peacock Brothers Limited.

CLEVELAND
Worm Gear
Speed Reducers

Adding New Facilities To America's Industrial Might!

Middle bay of new Kenosha copper tube mill showing 100-foot, triple-die draw benches and annealing furnace.

Faster production, higher precision, greater efficiency! These are the answer of American industry to the enemies of world freedom. Typical of the achievements that help the nation's industrial mobilization is the current mill improvement program of The American Brass Company.

A recently completed phase of that program is the new copper tube mill at the Kenosha, Wisconsin, Branch. This plant produces large quantities of highly essential copper tubing—and produces it more efficiently than ever before. An important feature of the mill is the high-capacity Mannesmann tube-forming machine used to convert cylindrical billets into heavy-walled seamless copper tubes. The Midwestern location of the Kenosha mill speeds delivery to industrial plants across the nation.

Right now the country's defense needs have first call on Anaconda Copper, Brass and Bronze. But finer things for a world at peace are sure to result from our plant improvement program. These mighty metals serve your freedom today—your comfort and convenience tomorrow. 51322A

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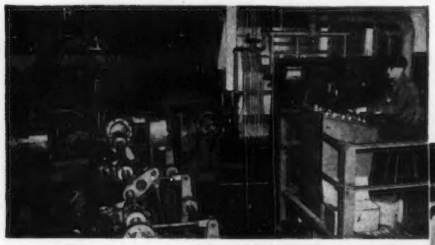
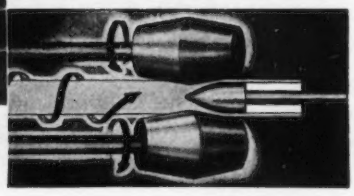




View of Mannesmann tube forming machine. The diagram illustrates the Mannesmann process whereby the roller action creates the cavity that is kept centered by the stationary mandrel.

Wherever Engines Work...

they need PERFECT OPERATING TEMPERATURES for

It's a fact! To get all of the power, life and performance which has been designed and engineered into it . . . an engine MUST operate at its most efficient temperature . . . constantly!

That's what KYSOR Automatic Shutters team up with motors to supply . . . perfect operating temperatures, with resulting longer engine life, fuel savings, and fewer major overhauls.

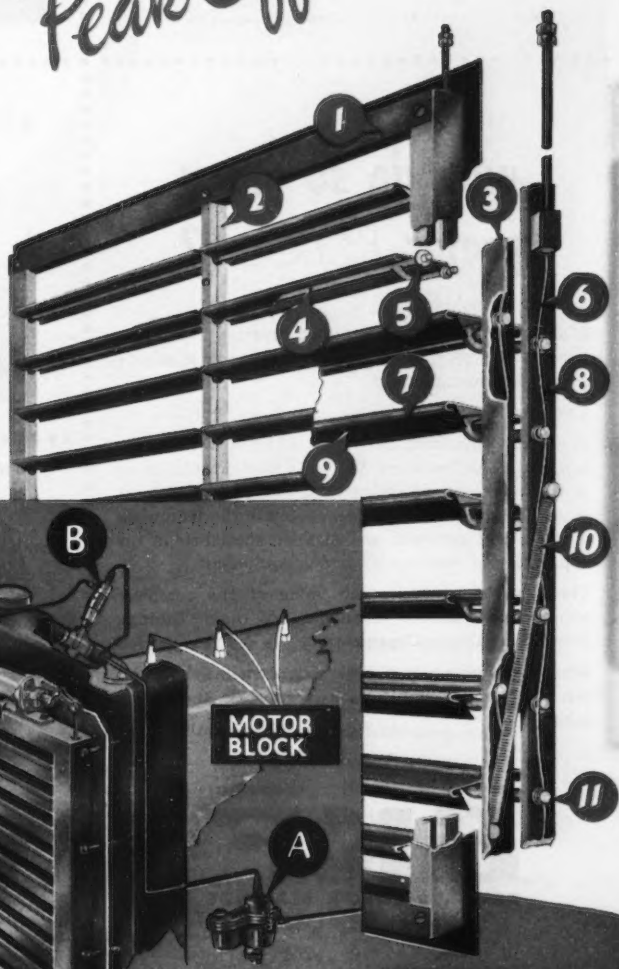
In trucks, diesel locomotives, stationary engines, heavy construction machines . . . wherever engines work, KYSOR makes 'em produce MORE—LONGER!

Write for catalog and complete information.

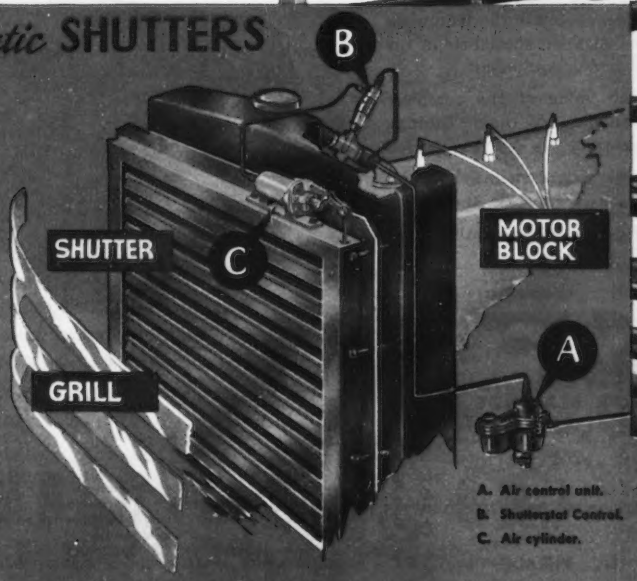
they get it with

KYSOR

Peak Efficiency



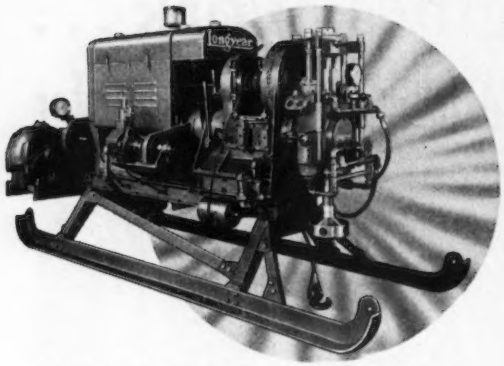
Automatic SHUTTERS



A. Air control unit.
B. Shutterstat Control.
C. Air cylinder.

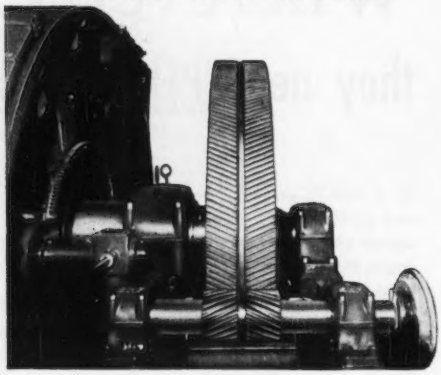
Red numerals on cut-away view show KYSOR'S eleven key points of rugged construction. Other automatic controls are available to fit your engine requirements.

KYSOR HEATER COMPANY • CADILLAC, MICHIGAN



SKF-equipped E. J. Longyear Company Diamond Core Drill.

SKF-equipped Vulcan Iron Works Mine Hoist.



SKF-equipped Robert Holmes & Brothers, Inc., Two-Speed Hoist and Head Sheaves.

SKF-equipped Brown-Fayro Company Car Spotting Hoist.

why do so many prefer SKF?

It's pretty hard *not* to buy good bearings today, but SKF is the preferred bearing with many a mining equipment manufacturer.

There are good reasons why!

These manufacturers know SKF as a reliable, friendly supplier. They've learned to have implicit confidence in the experienced bearing engineering specialists at SKF's headquarters. They appreciate the teamwork of SKF field men who are qualified specialists in the application of bearings to mining equipment.

Their customers know the value of the complete maintenance service available to them through SKF's Distributor Organization.

Whatever your product, your engineers and designers can have this helpful SKF teamwork simply by asking for it.

7283

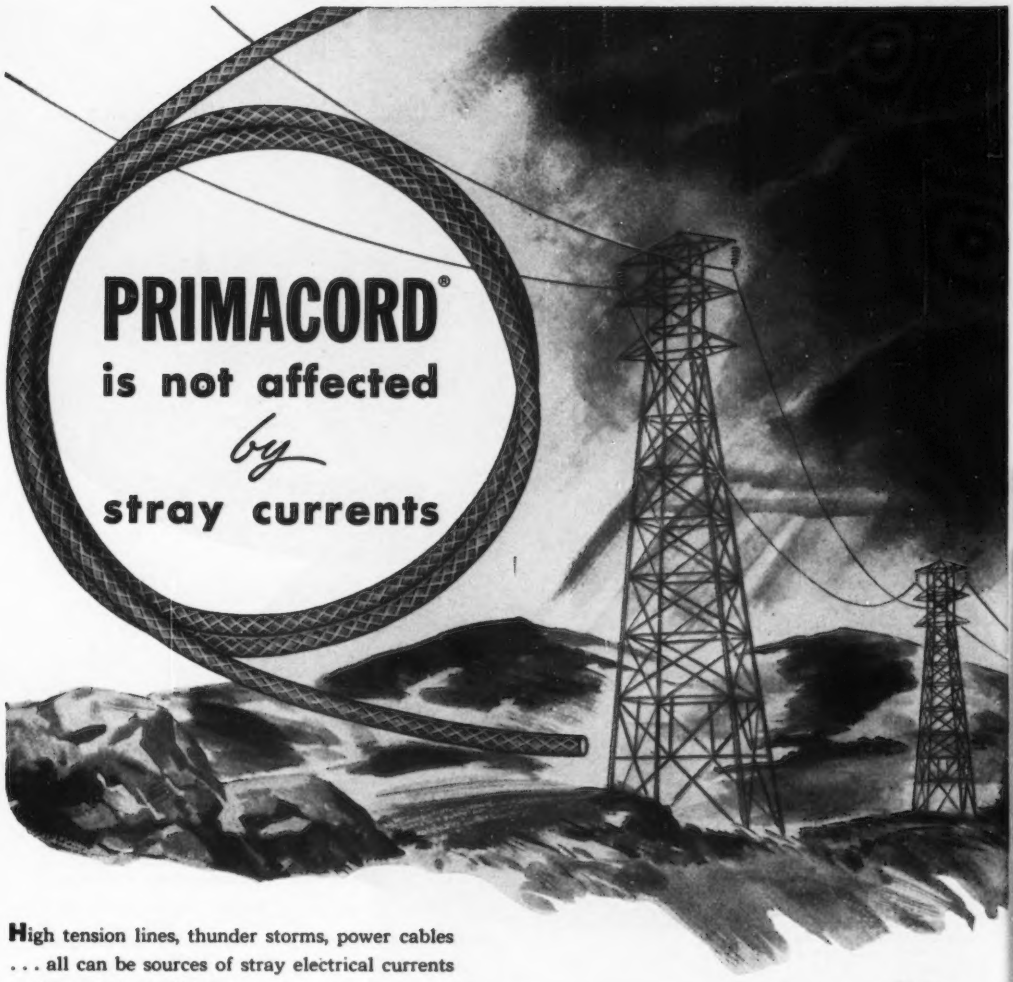
SKF

BALL AND ROLLER BEARINGS

8 REASONS WHY SKF IS PREFERRED BY ALL INDUSTRY

integrity • craftsmanship • metallurgy
tolerance control • surface finish
product uniformity • engineering service
field service

SKF INDUSTRIES, INC., PHILADELPHIA 32, PA.—*manufacturers of* **SKF** *and* HESS-BRIGHT *bearings.*



High tension lines, thunder storms, power cables . . . all can be sources of stray electrical currents under certain conditions.

When blasting you can guard against them by using Primacord as the primary detonating agent because Primacord is not affected by stray currents, nor can it be set off by friction, sparks, or ordinary shock. It must be detonated to produce the powerful explosive wave which travels at approximately 4 miles per second throughout its length.

Use Primacord from top to bottom in each hole, and to connect all holes. You'll get good shots with more work from your explosives, easier digging and better output.

* * *

Reinforced Primacord for trunk lines and deep holes where extra tensile strength and resistance to abrasion are desirable; Wire Countered Primacord for deep, ragged holes and high abrasive conditions; Plastic Reinforced Primacord for very deep, wet holes, river crossings, etc.; Plain Primacord for surface trunk lines and shallow holes. P-54

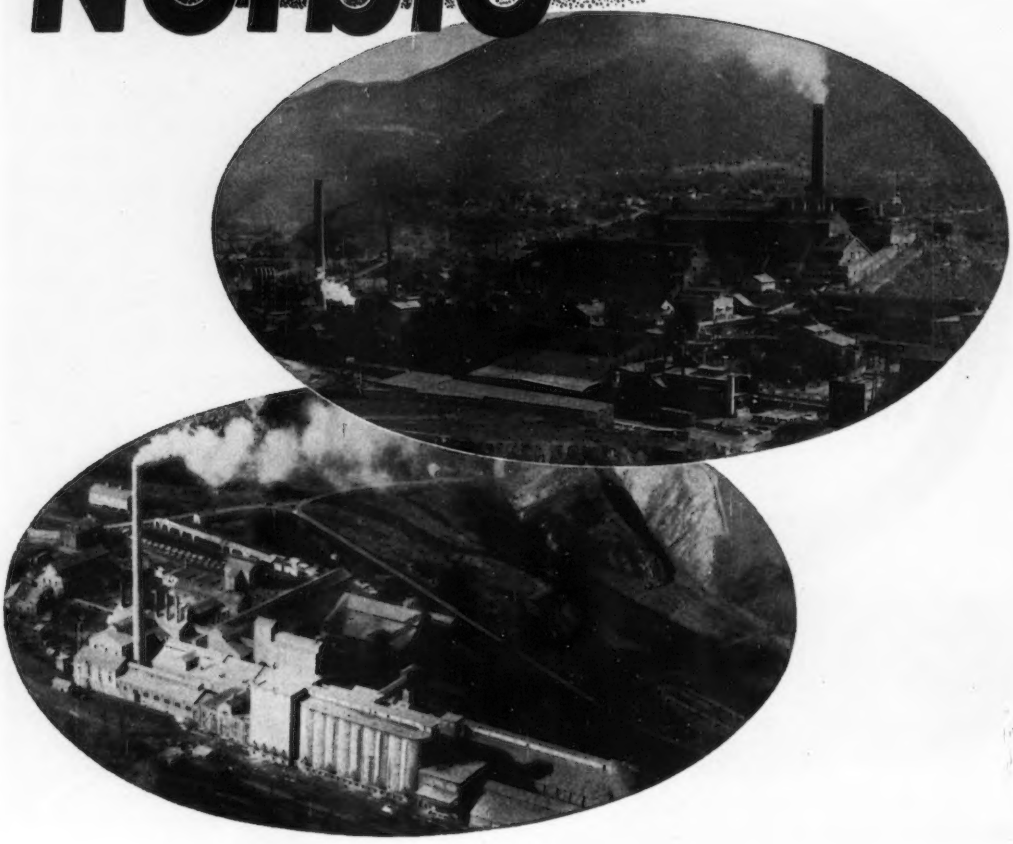
The Ensign-Bickford Company
Simsbury, Connecticut

PRIMACORD®-BICKFORD

DETONATING FUSE

Also Ensign-Bickford Safety Fuse — Since 1836

Norblo



Efficient, Economical Dust and Fume Collection...

78 cylindrical bags, totalling 936 square feet of free cloth area are the basic unit of Norblo Automatic Bag Type Dust Collectors. Bag cleaning, one unit at a time, takes only a few seconds, the air flow being reversed during the shaking. Thus Norblo operates continuously at full rated capacity of the cloth area. Timing can be adjusted to dust load changes without shutting down.

Norblo automatic dust and fume collection systems are built for continuous heavy duty service at low cost. Maintenance is simple. More than 30 years of experience in cement and rock products, mining and smelting are assurance of dependable star performance. Write for Bulletin 164-2.

THE NORTHERN BLOWER COMPANY

Engineered Dust Collection Systems for All Industries

6410 BARBERTON AVE. • CLEVELAND 2, OHIO

How to read with your eyes open for business!

Read the ads! Every issue of this magazine contains ads that offer valuable services and useful products by which your business may be run more profitably.

The time it takes to read all the ads is time well spent. One ad alone can pay off—by informing you of new developments and new sources of supply, by helping you do a more efficient job. For example, you may locate one machine that will cut your production costs, or step up your output. Or you may discover that the equipment you've been waiting for is now available.

This magazine displays more ideas and merchandise than a trade exposition. Make every issue your buyer's guide. Read the ads as well as the articles. That's reading with your eyes open for business.

HEADQUARTERS FOR BUSINESS INFORMATION

McGRAW-HILL publications

BECKMAN

—and only Beckman—

provides such wide range versatility in Glass pH Electrodes . . .

The importance of modern pH equipment is widely recognized in many fields . . . from food processing to sewage treatment—mining and smelting to electroplating—textile manufacturing to sugar refining. But when considering pH equipment for *your* problems always remember this . . .

"No pH meter is better than electrodes designed for use with it!"

Only Beckman provides such a wide variety of versatile, accurate and dependable electrodes—a type to meet virtually *every* industrial, research, laboratory and medical requirement. This is your assurance that, in Beckman pH equipment, you have maximum adaptability to widely-varying pH applications.

FREE . . . a convenient 28-page catalog illustrating the complete line of Beckman electrodes and pH equipment is available from your authorized Beckman Instrument dealer. Or write direct.

Whatever your pH electrode requirement, contact Beckman.

BECKMAN INSTRUMENTS INC.

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Factory Service Branches: Chicago • New York • Los Angeles

Beckman Instruments include: pH Meters and Electrodes—Spectrophotometers—Radioactivity Meters—Special Instruments

Typical Advantages of Beckman Electrodes

Virtually Unbreakable

Where abrasive slurries or rough industrial service are problems, Beckman has the answer with electrodes so strong, so tough, so chemically-resistant to alkalies and acids they set entirely new standards of durability!

Extreme Temperatures

Want to make measurements in solutions as cold as 20°C. *below* zero . . . or as hot as 130°C. *above?* Hot, cold or in-between, there's a Beckman pH Electrode to do the job!

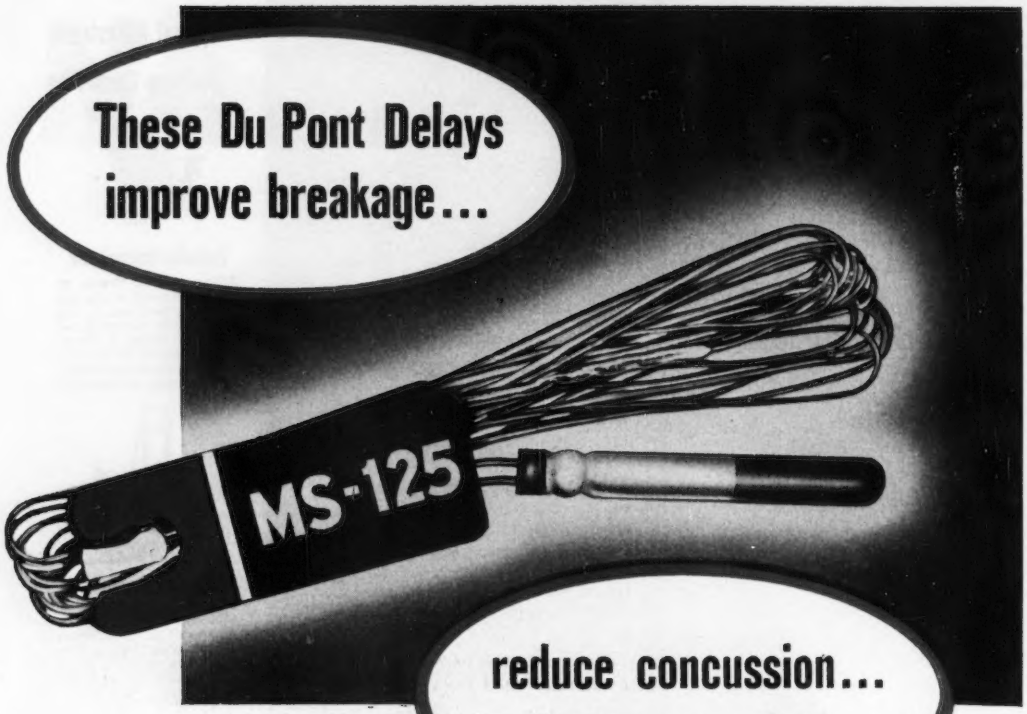
Wide pH Range

Electrodes covering the full pH range permit accurate measurements even at extreme limits with negligible sodium ion error whether test solution is hot or cold!

Unique Construction

Beckman glass electrodes are factory-sealed, require no maintenance, feature patented internal shielding, heat-resistant construction, integral leads and many other advantages!

These Du Pont Delays improve breakage...



reduce concussion... increase safety

Du Pont "MS" Delay Electric Blasting Caps met with instant approval when they were introduced. Mine operators quickly recognized that "MS" Delays did a better job in many types of blasting than either the conventional long-interval delays or caps and fuse.

Better Fragmentation resulting from the use of "MS" (Millisecond*) Delays is a BIG advantage. It increases production . . . cuts down both blockholing and chute blasting. Breakage is improved even in badly shattered formations.

Reduced Concussion is another big advantage of "MS" Delays. It means less damage to pillar walls.

Greater Safety is always of topmost importance, and the short intervals of "MS" Delay Caps practically eliminate dynamite from the muck. In common with all Du Pont electric blasting devices, these delays are made with waterproof rubber-plug closures, aluminum foil shielded shunts and plastic insulated wires.

Ask the Du Pont Explosives representative in your area for complete information about "MS" (Millisecond) Delay Electric Blasting Caps. E. I. du Pont de Nemours & Co. (Inc.), Explosives Dept., Wilmington 98, Delaware.

**Available intervals of delay: .025, .050, .075, .100, .125, .150, .175, .200, .250, .300, .350, .400, .450 and .500 seconds.*

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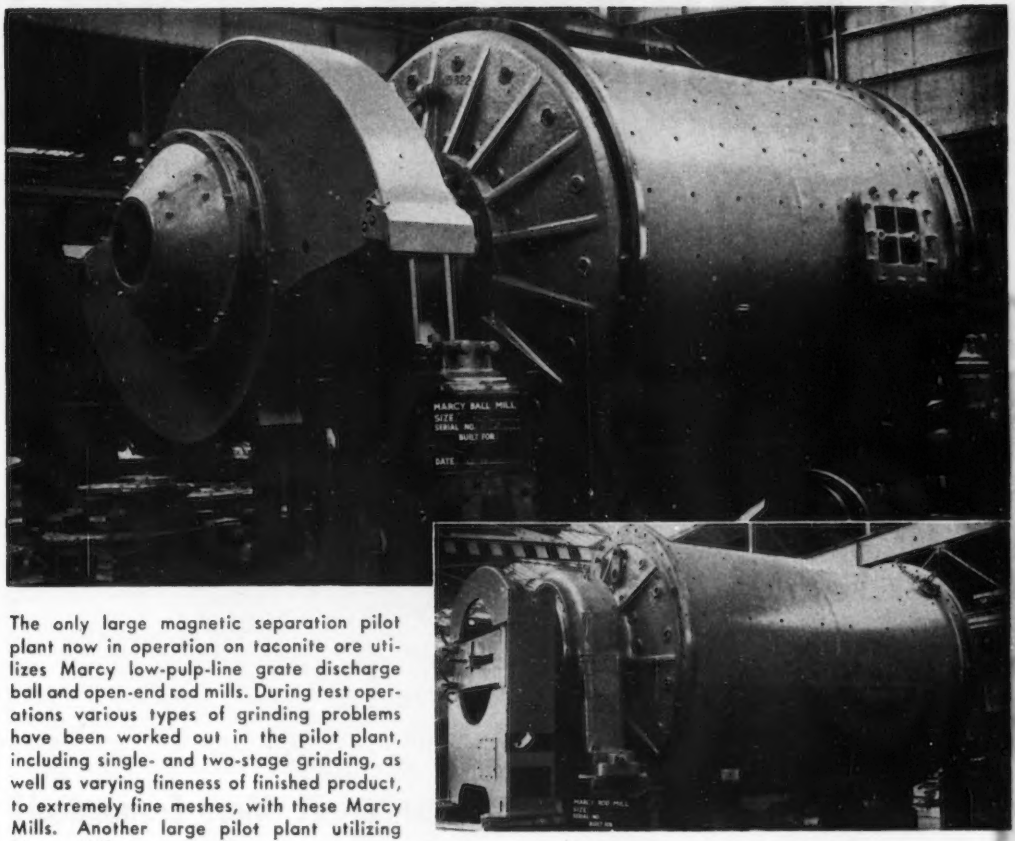
MARCY LOW-PULP-LINE MILLS GRIND TACONITE



The only large magnetic separation pilot plant now in operation on taconite ore utilizes Marcy low-pulp-line grate discharge ball and open-end rod mills. During test operations various types of grinding problems have been worked out in the pilot plant, including single- and two-stage grinding, as well as varying fineness of finished product, to extremely fine meshes, with these Marcy Mills. Another large pilot plant utilizing Marcy Mills is now under construction.

Like other Marcy Mill installations on various ores, these pilot plant mills are proving their high capacity and grinding efficiency, due to rapid circulation of mill contents. In a Marcy Mill there is less overgrinding, better utilization of power, lower cost per ton of ore ground.

Shop photos of the Marcy Mills designed for the pilot plant mentioned.

Our Marcy engineers are available for consultation on any grinding problem. If you have use for milling and metallurgical equipment, write for Catalog No. 108-B, completely revised and up-to-date.

Other MASSCO products: Massco-Fahrenwald Flotation Machines, Genuine Wilfley Tables, Massco-McCarthy Hot Millers, Rock Bit Grinders, Density Controllers, Belt Feeders, Rubber Pinch Valves, Assay and Laboratory Supplies and Equipment, Complete Milling Plants.

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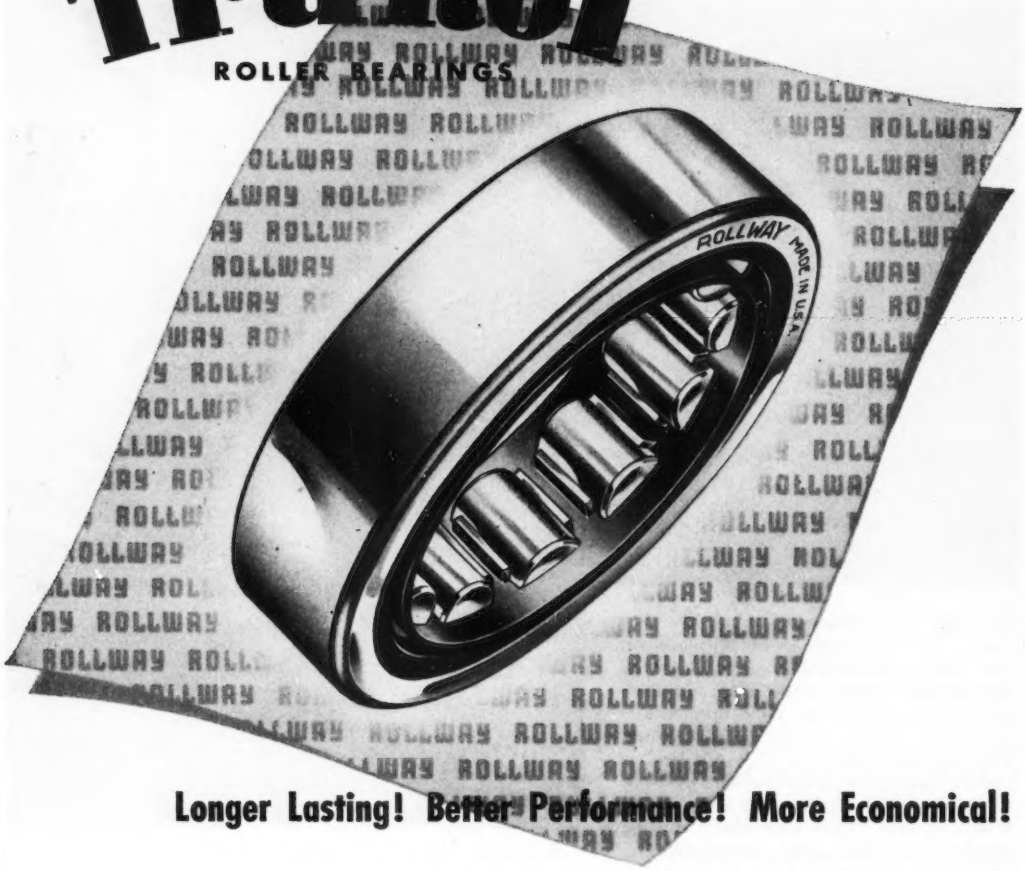

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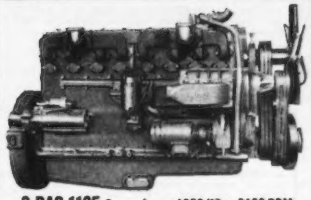
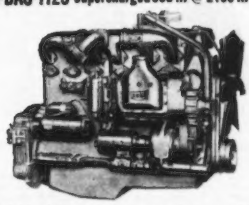
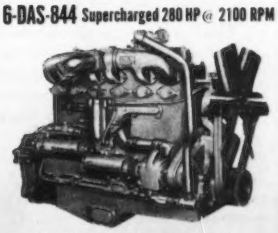


8-DAS-1125 Supercharged 350 HP @ 2100 RPM



6-DAS-844 Supercharged 280 HP @ 2100 RPM



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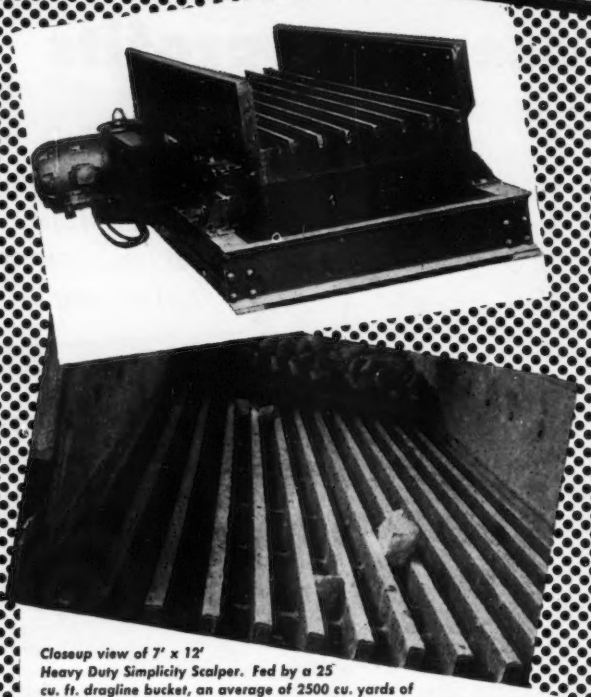

Closeup view of 7' x 12' Heavy Duty Simplicity Scalper. Fed by a 25 cu. ft. dragline bucket, an average of 2500 cu. yards of material passes through the 5" opening between the riding rails each hour. Approximately 250 cubic yards of boulders are scalped off the top.

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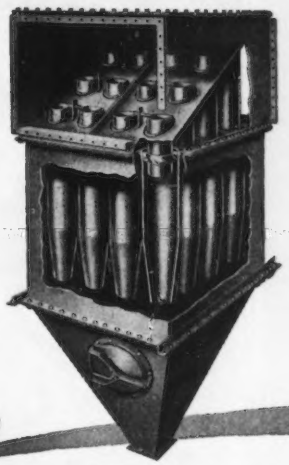


COMPARE ALL OTHERS against MULTICLONE'S Multiple Advantages

Because the advantages of MULTICLONE are so clear-cut, so vitally important, so far-reaching in the savings they make, we urge you to make a factual unbiased comparison of MULTICLONE dust and fly ash collection equipment against *any other* in the mechanical recovery field. Only by making such a comparison can you fully appreciate the major savings and greater performance you get by installing MULTICLONE Collectors!

COMPARE Recovery Efficiency!

It is a recognized fact that the separating efficiency of a cyclonic tube *increases* as the tube diameter *decreases* because smaller tubes generate greater centrifugal forces. The patented vane in the MULTICLONE makes the use of small tubes *practical* without complicated manifolding and permits compacting many small tubes into one simple, highly efficient unit. MULTICLONE's higher centrifugal forces throw out not only the large, medium and small particles, but also an unusually high percentage of the *extremely small* particles of 10 microns and less. Result—*more complete recovery of all suspended particles from the gas stream!*

COMPARE Space-Saving Compactness!

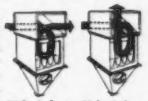
Plant space costs money—particularly at today's high construction costs. Because the MULTICLONE is more compact, size for size, it makes *really important* savings in space and plant costs. Note in the chart how the MULTICLONE requires substantially less space—*both in floor space and cubic space*—than any other unit of comparable capacity and performance. *This means vital savings in construction costs!*

Make	Relative Space Requirements In Sq. Ft.	In Cu. Ft.
Multiclone	1.0	1.0
Collector A	2.1	1.8
Collector B	5.9	3.2
Collector C	6.8	3.9

COMPARE Dollar-Saving Adaptability!

Savings in space is just one of many ways MULTICLONE reduces installation costs. Because the shape of the unit can be readily varied (long and narrow, short and wide, or square) to fit available spaces, the MULTICLONE can often be tucked into odd corners and waste areas too restricted for other equipment.

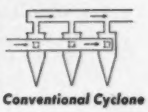
Moreover, inlet-outlet ducts can be varied—side-inlet side-outlet, or side-inlet top-outlet—to meet low headroom or restricted side clearance requirements . . . and the single-inlet single-outlet duct design permits greater flexibility and simpler installation. *These all add up to vital savings in installation costs!*



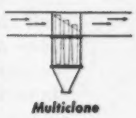
Side inlet, Side outlet **Side inlet, Top outlet**

COMPARE All-Around Simplicity!

The MULTICLONE is simple and inexpensive to maintain because there are no highspeed moving parts to repair or replace . . . no pads or filters to clean or renew . . . nothing to choke the gas flow or increase draft losses as suspended materials are recovered. In addition, the square, flat-sided shape of the MULTICLONE and its straight inlet and outlet ducts are far simpler to install and insulate. And since the recovered material from an entire bank of tubes is collected in a *single* hopper, it is much easier to service and maintain than the multiple hoppers of conventional cyclone units. *Here again, the* MULTICLONE *saves in many ways—all of them important!*



Conventional Cyclone



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Whether your recovery installation is in a new structure or for modernizing present equipment, you will be far ahead by installing MULTICLONE Collectors. Our experienced engineers will gladly make helpful suggestions for simplifying your recovery problems. A letter, wire or call to our nearest office places this assistance at your service without obligation.

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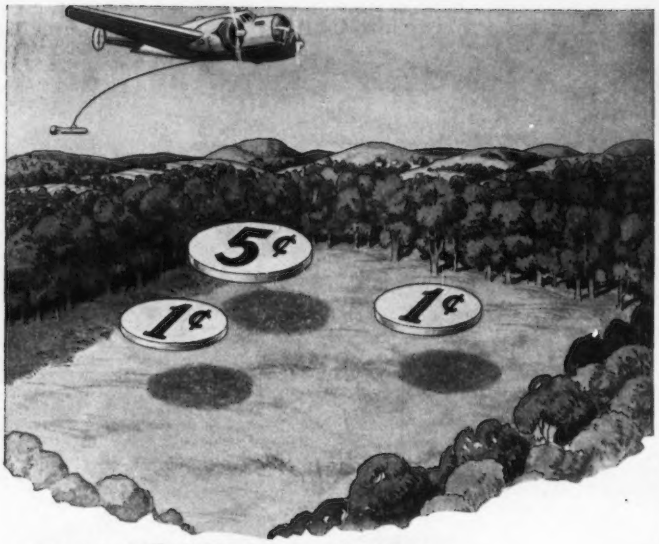

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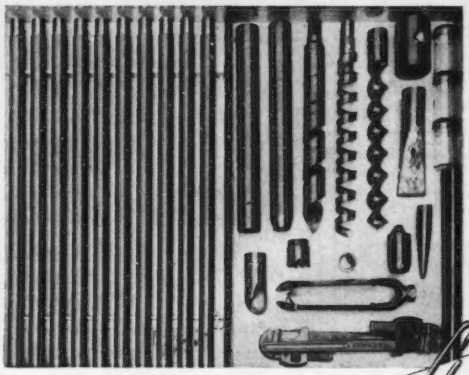

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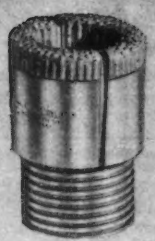

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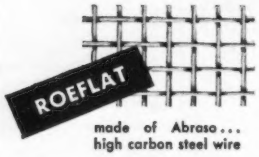

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8. INCREASE your importance to your company by informing yourself about advances demonstrated at this Exposition. In this way you will be better equipped to improve the operating efficiency of your plant.

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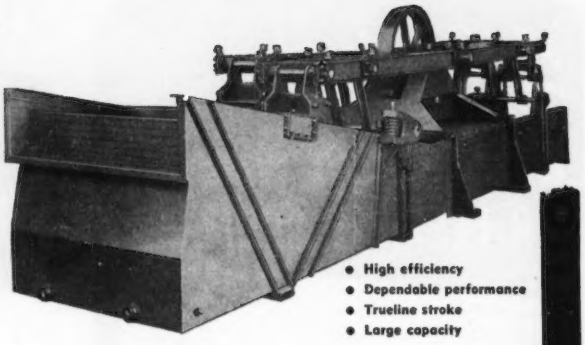
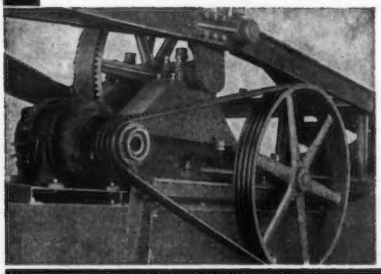
MORSE

"Trueline"
RAKE CLASSIFIERS

DEPENDABLE CLASSIFIERS THAT IMPROVE PERFORMANCE, SIMPLIFY OPERATION AND LOWER MAINTENANCE.



- High efficiency
- Dependable performance
- Trueline stroke
- Large capacity



Large and quiescent pool areas give high overflow efficiency. Long "Trueline" strokes, parallel to the tank bottom, discharge the maximum quantity of sands. Fabricated steel construction gives extra strength and long service.

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Smooth Operation
Metallurgically Right

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with the 1½" x 1½ HP

NEW TIW

Vertical Centrifugal

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HIGH EFFICIENCY
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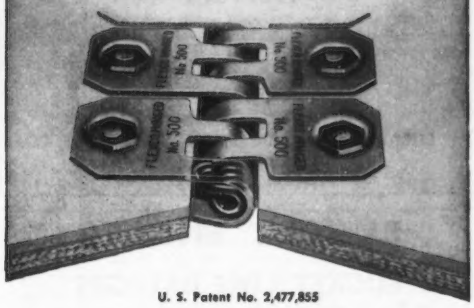
BELT FASTENERS



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- For joining underground extension conveyors.
- A FLEXCO fastener that is HINGED. Has removable hinge pin.
- Troughs naturally, operates smoothly through take-up pulleys.
- Strong, durable . . . strain is distributed uniformly across joint.
- For conveyor belts 3/8" to 1/2" thick.

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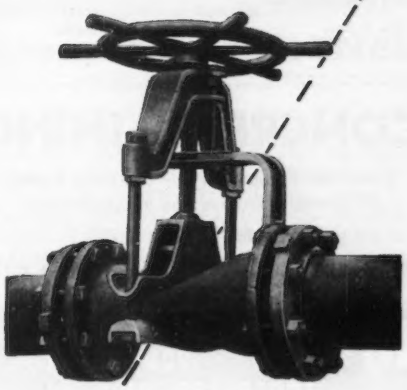
Massco-Grigsby

Rubber

PINCH VALVES

Resist Abrasive Pulps



● Severe abrasive and corrosive pulps quickly destroys metal valves while these rubber pinch valves show little wear. They shut tight, even on solid particles. There are no packing glands, and freezing does not damage the patented hinged design sleeve. Sizes 1" to 12" available for continuous pressures up to 100-150 psi.

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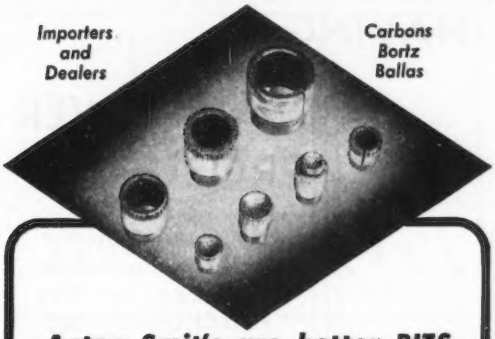

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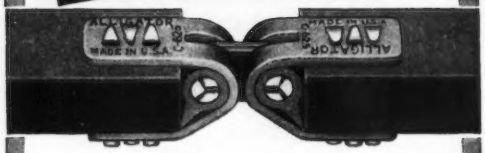

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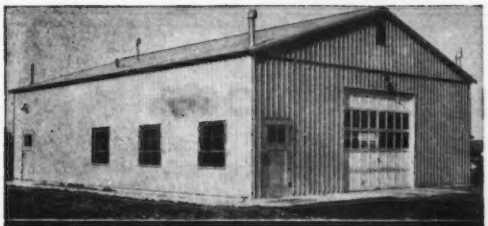

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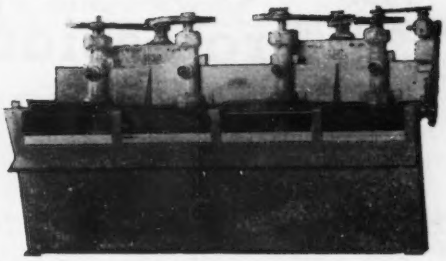

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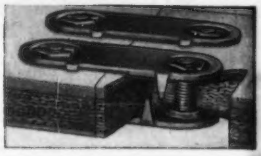

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SAN FRANCISCO: 68 Post St. (4)

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P1763 ENGINEERING & MINING JOURNAL
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GEOLOGIST 17 years experience USA, Latin America seeks position with Mining or development firm. PW-2022, Engineering & M Jl.

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Additional Positions Vacant & Business Opportunity Advertising on page 196

Equipment needed immediately:

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— (Centrifugal) 3 only 1-½" Acid Proof
2 only 2" " "
2 only 2-½" " "
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with or without tanks 4 only for 10' x 10' "
Fans — 3 only 10" to 15" or larger (Acid proof)
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Motor — Generator set — 1 only 2000 amp 15 volt.
Tanks — 1 only 1,000 gal. steel
1 only 12,000 gal. steel or 2 only 6,000 gal. steel
Mixer — 1 only Patterson Type G.P.M. Mixer approximately 24" x 20" x 120"
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6 only 20 foot single thickeners.
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This mine will be open for inspection and investigation until October 31st, 1951. Any one interested can investigate and make a sealed bid on either one or both propositions. Bids will be opened on the ground at Two O'clock, Oct. 31st, 1951. The three best bidders will be considered and notified at once. Bids can be sealed and left with Bennie Wray at the farm. I reserve the right to reject any or all bids.

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a magazine for collectors.

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P7942, Engineering & Mining Journal
330 West 42nd St., New York 18

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1—Sullivan 2 drum electric slusher hoist, model 8-211
1—Ingersoll-Rand new 3 drum electric slusher hoist, size 20-MNM-20
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1—2-2½ ton Whitcomb battery, 24" gauge
2—7 ton G.E. permissible type battery, 36 gauge
2— 8 ton G.E. battery, 36" gauge
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1— 3 ton Whitcomb gas engine driven, 24" gauge
1— 3 ton Ruth gas engine driven, 18" gauge
1— 6 ton Geodman trolley, 36" gauge

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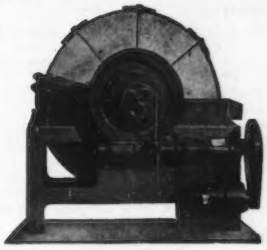
3—Dorr type H agitators for 22' dia. tank 14' high
4—Devereux type agitators, 8' x 8'
4—Devereux type agitators, 10' x 10'



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1—4' x 6' Morse drum filter
1—6' 2 disc. American filter
2—8' x 12' Eimco drum filters
1—4' single disc Oliver filter
1—18" Morse round pattern filter press
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2—3' x 2' Marcy ball mills
1—4' x 4' New standard ball mill
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1—5' x 4' Colo. Iron Works ball mill
1—3' x 8' Marcy Rod Mill

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2—12B Eimco rocker shovel loaders
1—#20 Eimco rocker shovel loader
2—#21 Eimco Rocker shovel loaders
4—#50A Conway muckers

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1—#8H 42" Jeffrey "Aerodyne" mine fan.
1—6½" x 22¾" Roots rotary blower.
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1—American #7 "Sirocco" exhaust blower.
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3—15 KW sets, Century Generators, Waukesha-Hesselman diesel engines.
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1—1" Wilfley sand pump
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1—3" Telluride sand pump
1—4" Allen-Sherman-Hoff hydro-seal
1—4" Denver vertical sand pump
1—6" Wilfley sand pump

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12 Diesel 100, 80, 65, 45, 30, 20 Ton Locomotives.
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2—60x84", 40x48", 36x42", 24x36" & 28x36".
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Kilns, 6'x60', 4'x45' & 9'x170'.
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Rotary Kilns—6½ x 60'—8½ x 9½ x 200'.
Rotary Dryers—3' x 30'—7' x 30'—8' x 40'—8½' x 50'—8½' x 60'—8½' x 70' & 7½' x 70'.
Tube & Ball Mills—6' x 9'—5' x 22'—5½' x 16'.
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Jaw Crushers—From 10" x 6" up to 38" x 24".
Crushing Rolls—From 18" x 12" up to 72" x 20".
1—Complete Lime Hydrating Plant.
Sturtevant Rotary fine crushers—No. 0—No. 1—No. 1½ and No. 2.
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Magnetic separators—Jigs—screens—classifiers and thickeners.
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New Dryer and Kilns.

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TOUGH COVERS—Heavy duty, specially compounded abrasive resistant rubber covers having high tensile strength. Thoroughly capable of withstanding the abrasive action of bulk materials. Properly vulcanized to the carcass to assure utmost performance, economically.
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FLEXIBILITY — Careful attention has been given in the construction of all belts to have the proper flexibility assuring the following desirable features: troughs easily, runs true on all idlers, gouge resistant, excellent for long and short hauls and slope installations.

Avoid delays in your production schedules!
We carry in stock for your immediate requirements, Conveyor Belting in widths from 8 inches to 48 inches.

Width	Ply	Thickness Top Cover	Thickness Bottom Cover	Type of Duck Carcass
8"	4	1/16"	1/32"	28 Oz.
10"	4	1/16"	1/32"	28 Oz.
12"	4	1/16"	1/32"	28 Oz.
14"	4	1/16"	1/32"	28 Oz.
16"	4	1/8"	1/32"	28 Oz.
18"	4	1/8"	1/32"	28 Oz.
20"	4	1/8"	1/32"	28 Oz.
20"	5	1/8"	1/32"	28 Oz.
24"	4	1/8"	1/32"	28 Oz.
24"	5	1/8"	1/32"	28 Oz.
26"	5	1/8"	1/32"	28 Oz.
30"	4	1/8"	1/16"	32 Oz.
30"	5	1/8"	1/16"	32 Oz.
30"	8	1/8"	1/16"	32 Oz.
36"	8	1/8"	1/16"	32 Oz.
42"	5	1/8"	1/16"	32 Oz.
48"	8	1/8"	1/16"	32 Oz.

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1—#21½ Vulcan Sgl. Drum, with U-6 Gas Power Unit, condition like new
1—15 HP Box I. Wks. Sgl. Drum with 15 HP Slip-ring Motor
1—#6½ Vulcan Hoist
1—7½ HP Hoist with Motor
CRUSHERS
1—9 x 40 Austin-Western Jaw Crusher
1—10 x 20 A.C. Blake Crusher
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2—#24, 8-cell Denver "Sub-A"—43"x43" cells—wood tanks, complete with motors and new rubber impellers
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1—30" x 8'
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1—36" x 6'
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1—50 HP Upright Boiler
1—32" x 16" F. M. Davis Crushing Roll
1—24" Denver Cone Reagent Feeder
1—30" x 48" Ball Mill
1—50 Ton Truck Scale—44' platform
1—12" x 18" Duplex Hartz Jig with motor
1—D-4400 Cat. Diesel V-belted to 30 KVA 220 volt AC Generator
1—60" x 23' Denver Cross-flow Simplex Spiral Classifier
1—12" x 30" Suspension Type Jeffrey Viv. Feeder
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7 Tons 16# Rail
Enclosed Safety Switches
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FAMOUS FOR REBUILTS
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RENT—SELL—BUY

NEW PORTABLES WORTHINGTON
315 Diesel — 4 Pneu
105 Gas — 4 "
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RENTAL-PURCHASE
GAS — DIESEL — ELECTRIC

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Denver-Engineering 2-drums 60" dia. rated cap. 12000# 600 FPM; 440-v.
Wellman-S-M 100 hp 2-drums; 440 volt
H&B (Vulcan) 75 hp 1-drum; 440 volt
Ottumwa 30 hp 1-drum; 440 volts
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1 Deco Super Agitator "Wallace" Type No. IRK8725 —5 x 6 — good condition — spare propelers—no motor. F.O.B. Fredericksburg $500.00
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2—Model 21 Elmco Rocker Shovels, 36" ga., new in 1948 and in excellent condition.
2—6 ton Whitcomb Locomotives, 36" ga., with 45 cell, 15 plate Exide Batteries, new in 1948 and in excellent condition.
10—70 cu. ft. Steel Dump Cars, 36" gauge.
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3 Phase, 440 Volts, 60 Cycle with Starters
Rugged Construction
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SQUIRREL CAGE MOTORS
3-Ph., 60-Cy.

Qu	HP	Make	Type	Volts	RPM
1	400	G.E.	JK	2200	514
1	400	G.E.	KT-412	2200	435
2	300	Whse.	CS-890	2300	1780
1	200	Whse.	CS-873C	2200	1160
1	200	Al.Ch.	AR	440/220	580
2	125	Al.Ch.	AR	2200	1750
1	125	Whse.	CS-761C	440/220	1750
1	125	C.W.	126-Q	440/220	430
2	100	Whse.	CS-663C	440/220	1750
1	100	G.E.	IK	440/220	1800
1	100	Al.Ch.	AR	2200	1160
1	100	Al.Ch.	AR	550	690
1	100	F.M.	H261B	440/220	435
1	100	Whse.	CS-938	2200	495
1	75	G.E.	I-K15	440/220	570
1	75	Al.Ch.	AR	2200	1765
1	75	Al.Ch	AR	2200	1750
1	75	Al.Ch.	AR	2200	690
1	50	G.E.	KT	440/220	1160

SYNCHRONOUS MOTORS
3-Ph., 60-Cy.

Qu	HP	Make	PF	Volts	RPM
1	3000	Whse.	80	4800/2400	720
1	700	G.E.	80	2300	720
1	600	Whse.	80	2400	720
1	400	Whse.	80	440	600
1	300	Whse.	80	440	514
1	150	G.E.	100	2200	900
1	150	G.E.	100	550/2200	600
1	150	G.E.	80	550/2200	450
3	125	El.Mchy.	100	4800/2400	900
1	125	G.E.	80	2200	900
2	100	Whse.	80	440/220	1800
1	100	Whse.	100	2200	1200
1	100	Ideal	80	220/440	900
2	100	G.E.	80	220/440	600

SLIP RING MOTORS—CONSTANT DUTY—3-Ph., 60-Cy.

Qu	HP	Make	Type	Volts	RPM
1**	3000	G.E.	MT	2200	356
1**	1200	C.W.	SR	2200	237

Qu	HP	Make	Type	Volts	RPM
2**	1000	Al.Ch.	ANY	2200	235
1**	600	G.E.	MT-20	2200	360
1	500	Whse.	C.W.	4600/2300	514
1	500	Al.Ch.	ANY	4000/2300	514
1**	400	Al.Ch.	ANY	2200	514
2	500	G.E.	I-16-M	2300	450
2	400	G.E.	MT-412	2300	450
1	300	G.E.	I-15-M	2200	1200
1	300	Al.Ch.	ANY	2200	514
1	250	G.E.	MT-414	2200	300
1	200	G.E.	I-16-M	2200	585
1	150	G.E.	I-13-M	2200	1750
1***	125	Whse.	CW-870	2200	870
1	100	F.M.	H10C	440/220	900
1	75	G.E.	13M	440/220	695
1	75	Whse.	CW-7540	440/220	690

** Mill type pedestal bearing. *** 3 bearing.

MOTOR GENERATOR SETS

Qu	KW	Make	RPM	Volts DC	Volts AC
1	2400 3U	Al.Ch.	720	525	4800/2400
1	1500	Whse.	514	250	4600/2300
2	1000	G.E.	514	575	4000/2300
1	500 3U	Whse.	1200	120/240	2300/440
2	500	C.W.	720	575	4000/2300
1	500	C.W.	720	250/275	4000/2300
1	500	C.W.	720	250/275	2300/440
1	200	Ridgway	900	250	2300
1	155	G.E.	720	250	2300/440
1	150	G.E.	1200	500	2300/440
1	100	Ridgway	1200	275	4000/2300
1	85	C.W.	1200	250	2300/440
1	75	Star	1200	230	440/220
1	75	Al.Ch.	900	250	2300
1	50	Burke	1800	240	440/220
1	30	Reliance	1800	250	440/220
1	25	Whse.	1200	120/240	440/220
1	20	Reliance	1800	250	440/220

(3U—3-unit set.)

TRANSFORMERS (Power)

Qu	KVA	Make	Type	Phase	Voltage
1	7500	G.E.	H	3	33000/29700-13800/12600
3	1500§	Gregory	(X)	3	4160-480
3	250	Packard	OISC	1	13200-2200

Qu	KVA	Make	Type	Phase	Voltage
3	150	G.E.	H	1	19000/9500-550/2200
3	100	Whse.	SS	1	12075/10955-230/460
3	100	G.E.	HT	1	33000-2400
3	50	Al.Ch.	OISC	1	22000-220
2	℄ 50	Wagner	HE	1	13200/11880-575/287
3	50	Penna	OISC	1	2400/4160-Y-120/240

(X) New, selfcontained, indoor type, air cooled.

DIRECT CURRENT MOTORS

Qu	HP	Make	Type	RPM
1***	3000	Whse.	Encl.(Rev.)	600
1***	2400	Whse.	Encl.(Rev.)	600
4***	1500	Whse.	Encl.(Rev.)	600
4***	1200	Whse.	Encl.(Rev.)	600
4***	800	Whse.	Encl.(Rev.)	600
1	350	G.E.	CD-149	1150
1	325	Whse.	QM-460.6	450/900
1	200/250	El.Dy.	No. 32	400/1200
1***	200	G.E.	MPC	500/1200
1	200	Whse.	Mill	300/1200
1	300	Whse.		240/300
1	180	G.E.	MPC	400
2*	150	C.W.	RI-H	600
1***	125	Whse.	SK-190	600
1	100/125	Rel.	1995-F	300/1200
2	100	Rel.	1050-T	400/1200
1	90/160	G.E.	MPC	625/1125
1*	50/75	Rel.	1995-F	300/1200
1	35	G.E.	RF-14	500/1500
1	35	G.E.	CD-125	400/1200
1	35	G.E.	CD-147	300/1200
1	35	Rel.	35P	250/1000
1	32½	Whse.	SK-150	400/1200
1*	30/75	Whse.	SK-151L	400/1200
1	30	Al.Ch.	E-145	400/1200
1	30	G.E.	CDM-105	875/1750
2	27½	El.Dy.	15S	450/1250
1	25	G.E.	RF-13	400/1600
1	25	G.E.	CD-123	400/1200
1	25	Whse.	SK-140	400/1200
1	25	Whse.	SK-111L	250/1000
2	20	Al.Ch.	E-030	400/1200
3	20	G.E.	CD-123	300/1200

All above 230VDC except where marked ***.
*** Pedestal bearing mill design 525/600-VDC.
(Rev.) Designed for mill reversing service.
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PARTIAL LISTING

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1—Sullivan 14&8½x10
1—IR-PRE-2 25x15¾x18
1—IR-XCB 17&10½x14
Misc. Single Stage
CRUSHERS:
1—20x36 Universal
1—6x15 Wheeling
1—7x10 Blake
1—9x15 Blake
1—15x24 Blake
1—14½/8 Kennedy-Van Saun
1—No. 4 Gates Breaker
1—4' Traylor TY
FLOTATION:
1—6 Cell Denver No. 18
1—4 Cell Geco 24"
JIGS:
1—12"x18" Denver Duplex
3—12x20 Hartz Simplex
1—2 Cell 42" Pan-American
SCREENS:
3—12"x30" Two Deck
1—15"x42" Three Deck
1—24"x48" Denver Dillon
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1—Jeffrey Electric Vibrating
1—12" Belt
1—6" Belt Zinc Feeder
HOISTS:
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1—75/112 HP Single Drum
1—250 HP Ottumwa S.D.
1—15 HP Ottumwa S.D.
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1—5' Tread Head Sheave
Misc. Cages
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1—Dorr 20'x8' Low Head
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Mine Cars — Electric Motors — Pumps

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MISSOULA, MONT.

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FEEDER: Heavy duty manganese Apron Feeder 48" x 12 ft. with motor and drive. NEW condition.
CRUSHER, JAW: 30" x 42", all steel, roller bearing, with motor and drive. NEW condition.
CRUSHERS, REDUCTION: Symons 5½ ft. Cone, short head, with motor, etc., built 1950, NEW condition. Symons 2 ft. standard bowl, Cone. Telsmith 2 ft. and 3 ft. Gyrasphere. Traylor 4 ft., type TY.
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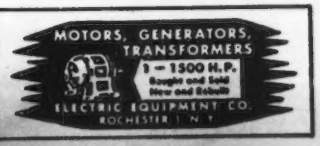
COMPRESSOR: Worthington 2 stage, 29/18½ x 21, 600 H.P. synchronous motor, 3 phase, 60 cycle, 440 volt, 180 RPM, 100 lbs. pressure, cap. 3000 CFM, complete with auxiliary equipment. In operation now, available immediately.
DIESEL MOTOR: 122 H.P. Caterpillar D13000 complete with clutch, V-belt pulley and spare parts.
BRIQUETTING PRESS: Capacity 18 tons per hour, 33" dia. rolls.
HOIST, SPECIAL: 1—200 H.P. double drum, 8' dia., 5' face, one clutched, one tight, 16,000 lbs., 750 FPM, with or without head frame, cages, skips, etc.
MINE HOISTS: Single and double drum 150 H.P. to 2500 H.P.
CLASSIFIERS: 2—WEMCO 78". 2—Aikens 54". NEW condition.
SCREEN: Tyler Tyrock 5' x 10', open type, scalper Screen. NEW condition.

A. J. O'NEILL
Lansdowne, Pa.
Phila. Phones: Madison 3-8300 - 3-8301



CRUSHERS FOR SALE

One Kennedy Van Saun No. 17 Crusher and one No. 37½ without spider casting. These crushers with motors and feeders never used. For particulars write W. H. Loomis Talc. Corp., Gouverneur, N. Y.

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SUBJECT TO PRIOR DISPOSITION

111M Marion. Combination Shovel, Dragline, 4 yd. Dipper, 80' Dragline Boom, Fairleads. Two General Motor-diesels. Good condition. New 1947. Serial 8608.
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111 M Marion Standard Shovel Attachment, 30 ft. boom, 23'8" Stick, 3¼ yd. Manganese Bucket. This item is brand new. Located in Johnstown, Pa. Immediate delivery at considerable less than replacement cost.
Manitowac model 2000B 1 ¼ c.y. Combination standard shovel and dragline with Caterpillar D-13000 diesel. Good condition.
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$58,000 FOB Conshohocken, Pa.

1—93M Marion 2½ yd. Combination Shovel and Dragline with Caterpillar D-17000 Diesel Engine, 1500 Watt Light Plant, 2½ c. yd. Dipper, Dragline Boom with Fairlead, 14000 lb. Extra Counterweight. Machine is in good condition. Serial 8782.
$37,000 FOB Johnstown, Pa.

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S.J.GROVES AND SONS COMPANY

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WHitehall 3-1055

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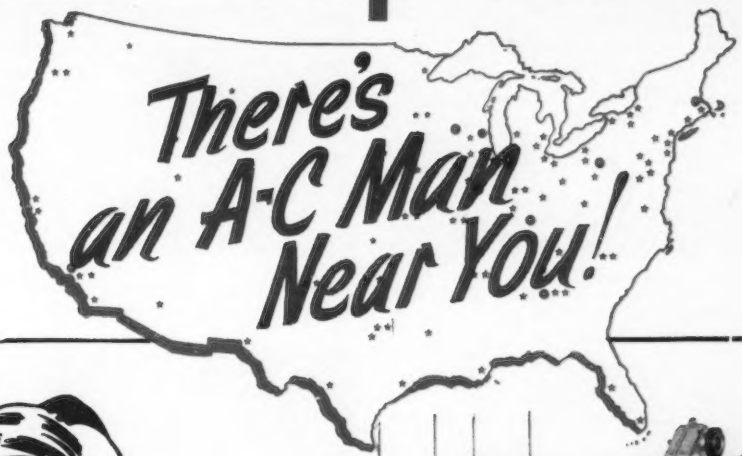
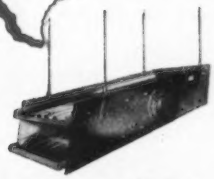
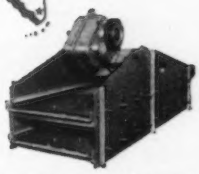






RIPL-FLO SCREEN
A high capacity inclined vibrating screen with two-bearing mechanism. Low weight, maintenance, power requirement.

LOW-HEAD SCREEN
A horizontal screen for wet or dry screening, rinsing or dewatering. Straightline motion. Saves headroom, space.

STYLE "C" SCREEN
Extra heavy duty screen particularly adapted for scalping. Handles pieces up to 3 by 4 ft, weighing 3,000 pounds.

AERO-VIBE SCREEN
A sturdy, low cost vibrating screen for lump or granular materials. Makes separations 1½ in. square to 28 mesh.

UTAH ELECTRIC SCREEN
Handles fine, granular materials from 10 to 48 mesh (dry) or 65 mesh (wet). Non-blinding device minimizes blinding.

ALLIS-CHALMERS district offices offer you the services of experienced vibrating screen engineers. In all mining areas are specialists who have the training and experience to help you get top screening performance and lowest screening costs for your job.

These experts will come into your plant, look over your present equipment, and suggest how your screening can be made a more profitable operation. Their recommendations are unbiased because Allis-Chalmers builds *all* types of vibrating screens . . . for *any* screening application. All Allis-Chalmers screens can be obtained complete with motor, drive and control.

Feel free to call on Allis-Chalmers for real help in solving screening problems. You'll be getting the finest engineering and experience available anywhere. Allis-Chalmers, Milwaukee 1, Wisconsin. A-3450

Pulverator, Low-Head, Ripl-Flo, Aero-Vibe and Utah are Allis-Chalmers trademarks.

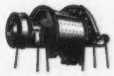
ALLIS-CHALMERS

Sales Offices in Principal Cities in the U. S. A. Distributors Throughout the World.

Pulverators

Vibrating Screens

Jaw Crushers

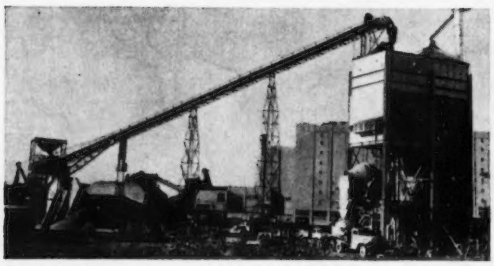

Grinding Mills

Gyratory Crushers

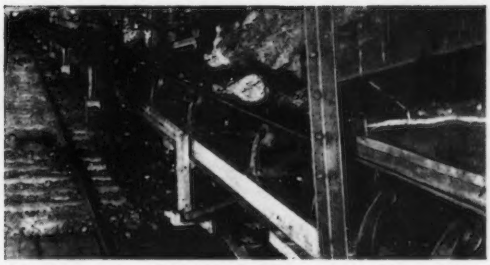
Kilns, Coolers, Dryers

FOR HEAVY-DUTY CONVEYORS...

IT'S TIMKEN®... AND TIMKEN...



Here's a 30" Pioneer conveyor that handles 1500 tons of aggregate a day for feeding the world's largest tilting concrete mixer. The 183-foot system has Timken® bearings in the idlers.



This Rex conveyor, built by Chain Belt Company, moves 300 tons of coal an hour on Timken bearings. Installed in 1949, the system has approximately 2700' centers with a 643' lift.

AND TIMKEN AGAIN!

Built by Link-Belt Company, this 900-ft. system conveys raw coal and mine refuse at a rate of 550 tons per hour with Timken bearing-equipped idlers.

AND HERE ARE 6 BIG REASONS WHY:

1 **THOROUGHLY PROVED.** The Timken bearing is the only tapered roller bearing proved by 15 years or more of service in heavy duty conveyor installations using the popular dead shaft construction.

2 **EXTRA CAPACITY.** Line contact between rollers and races gives Timken bearings high load capacity. And by using Timken bearing sizes that are mass produced for the automotive industry you get extra capacity bearings that actually cost *less* than the smaller sizes you'd normally use.

3 **LONG-LIFE LUBRICATION.** Not just lubricated for "life" but lubricated yearly or as conditions require to insure *long* life. Fresh lubricant ends gummy, sticky, jammed bearings.

4 **LONGER ROLLER AND BELT LIFE.** Less sliding and scuffing between idlers and belt.

5 **FRICTION MINIMIZED.** Timken bearings' true rolling motion and extremely smooth surface finish practically eliminate friction.

6 **MAINTENANCE REDUCED.** Long life and dependable performance of Timken tapered roller bearings cut maintenance to a minimum.

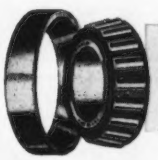
Remember "Timken" is not a bearing type. It is a trade-mark applying only to bearings made by The Timken Roller Bearing Company. Always use Timken bearings in your conveyors. The Timken Roller Bearing Company, Canton 6, Ohio. Canadian plant: St. Thomas, Ontario. Cable address: "TIMROSCO".

Wherever the going's tough industry turns to

TIMKEN

TRADE MARK REG. U.S. PAT. OFF.

TAPERED ROLLER BEARINGS



Typical application of Timken bearings for conveyor idlers.

NOT JUST A BALL ○ NOT JUST A ROLLER ⬭ THE TIMKEN TAPERED ROLLER ⬭ BEARING TAKES RADIAL ◫ AND THRUST ◫ LOADS OR ANY COMBINATION ✳